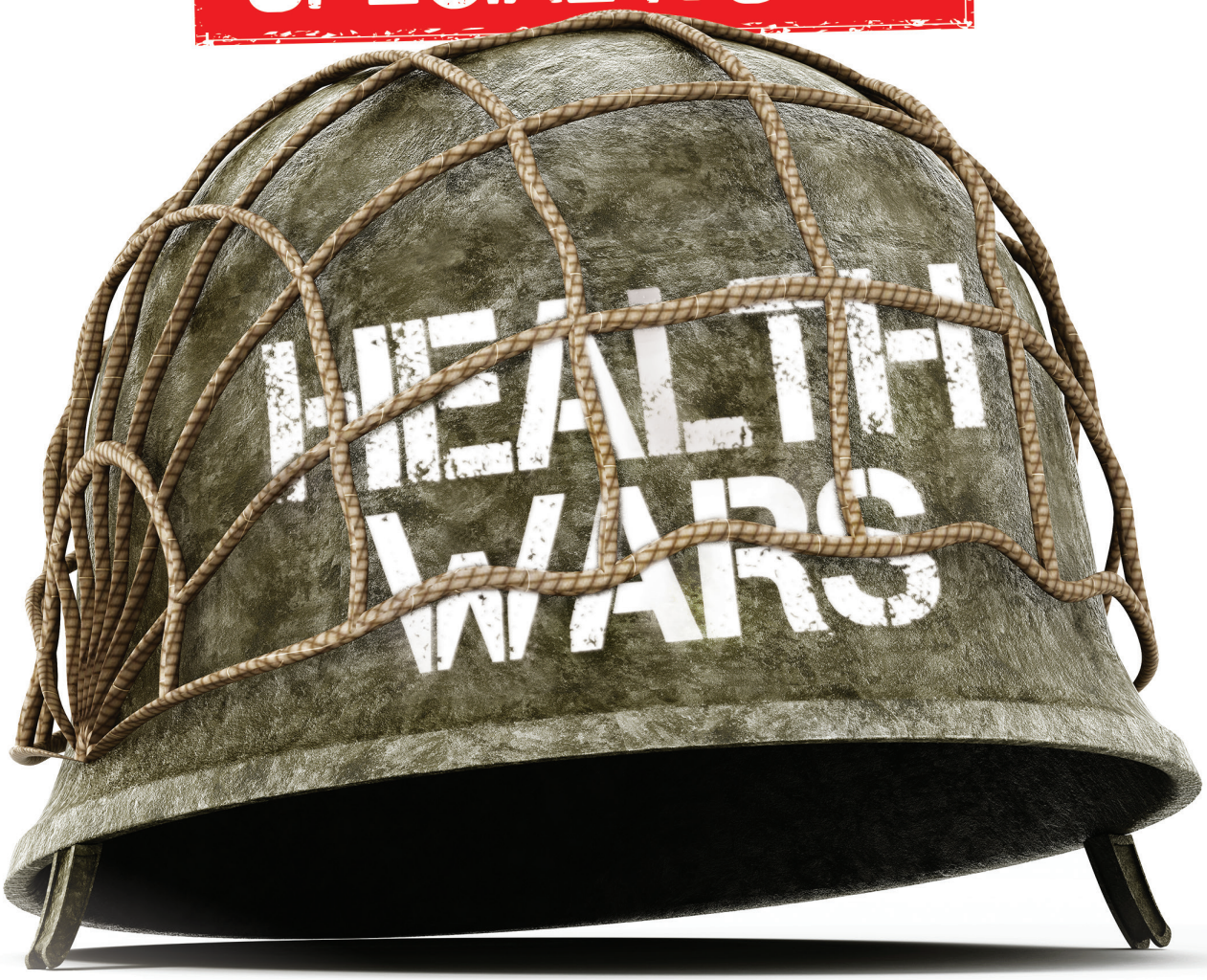
Opioids | Exorcisms | Science Attitudes | Balles Prize to CNN | Homeopathy Suits | Chernobyl

Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

Vol. 43 No. 5 | September/October 2019

SPECIAL ISSUE



INTRODUCTORY PRICE U.S. and Canada $5.99

IN THE TRENCHES AGAINST ALTERNATIVE MEDICINE

Published by the Center for Inquiry with the Committee for Skeptical Inquiry

Committee for Skeptical Inquiry www.skepticalinquirer.org

Robyn E. Blumner, President and CEO
Barry Karr, Executive Director
Joe Nickell, Senior Research Fellow
Massimo Polidoro, Research Fellow
Benjamin Radford, Research Fellow
Richard Wiseman, Research Fellow

Fellows

James E. Alcock,* psychologist, York Univ., Toronto
Marcia Angell, MD, former editor-in-chief, *New England Journal of Medicine*
Kimball Atwood IV, MD, physician; author; Newton, MA
Banachek, professional magician/mentalist, magic consultant/producer
Stephen Barrett, MD, psychiatrist; author; consumer advocate, Pittsboro, NC
Robert Bartholomew, sociologist, investigative journalist, Auckland, New Zealand
Willem Betz, MD, professor of medicine, Univ. of Brussels
Irving Biederman, psychologist, Univ. of Southern California
Susan Blackmore, visiting lecturer, Univ. of the West of England, Bristol
Sandra Blakeslee, science writer; author; *New York Times* science correspondent
Mark Boslough, physicist, Albuquerque, NM
Henri Broch, physicist, Univ. of Nice, France
Jan Harold Brunvand, folklorist; professor emeritus of English, Univ. of Utah
Mario Bunge, philosopher, McGill Univ., Montreal
Sean B. Carroll, molecular geneticist; vice president for science education, Howard Hughes Medical Institute, Madison, WI
Thomas R. Casten, energy expert, Hinsdale, IL
John R. Cole, anthropologist; editor, National Center for Science Education
K.C. Cole, science writer; author; professor, Univ. of Southern California's Annenberg School of Journalism
John Cook, Center for Climate Change Communication, George Mason University, Virginia.
Frederick Crews, literary and cultural critic; professor emeritus of English, Univ. of CA, Berkeley
Richard Dawkins, zoologist, Oxford Univ.
Geoffrey Dean, technical editor, Perth, Australia
Cornelis de Jager, professor of astrophysics, Univ. of Utrecht, the Netherlands
Daniel C. Dennett, Austin B. Fletcher Professor of Philosophy and director of Center for Cognitive Studies, Tufts Univ.
Ann Druyan, writer and producer; CEO, Cosmos Studios
Sanal Edamaruku, president, Indian Rationalist Association and Rationalist International
Edzard Ernst, former professor of complementary medicine, University of Exeter
Kenneth Feder, professor of anthropology, Central Connecticut State Univ.
Krista Federspiel, science journalist, expert on complementary and alternative medicine, Vienna, Austria.
Kevin Folta, molecular biologist, professor and chair of Horticultural Sciences Department, University of Florida
Barbara Forrest, professor of philosophy, SE Louisiana Univ.
Andrew Fraknoi, astronomer, University of San Francisco
Kendrick Frazier,* science writer; editor, Skeptical Inquirer
Christopher C. French, professor, Department of Psychology, and head of the Anomalistic Psychology Research Unit, Goldsmiths College, Univ. of London
Julia Galef, host of the *Rationally Speaking* podcast; cofounder, Center for Applied Rationality, Berkeley, CA
Luigi Garlaschelli, chemist, Università di Pavia (Italy); research fellow of CICAP, the Italian skeptics group
Maryanne Garry, professor, School of Psychology, Victoria Univ. of Wellington, New Zealand
Susan Gerbic, founder and leader of Guerilla Skepticism on Wikipedia (GSoW) project
Thomas Gilovich, psychologist, Cornell Univ.
David H. Gorski, cancer surgeon and researcher at Barbara Ann Karmanos Cancer Institute and chief of breast surgery section, Wayne State University School of Medicine
Wendy M. Grossman, writer; founder and first editor, *The Skeptic* magazine (UK)
Susan Haack, Cooper Senior Scholar in Arts and Sciences, professor of philosophy, University of Miami
Harriet Hall,* MD, physician; investigator, Puyallup, WA
David J. Helfand, professor of astronomy, Columbia Univ.
Terence M. Hines, prof. of psychology, Pace Univ., Pleasantville, NY
Douglas R. Hofstadter, professor of human understanding and cognitive science, Indiana Univ.
Gerald Holton, Mallinckrodt Professor of Physics and professor of history of science, emeritus, Harvard University
Deborah Hyde, skeptic, folklorist, cultural anthropologist, Editor in Chief, *The Skeptic* (U.K.)
Ray Hyman,* psychologist, Univ. of Oregon
Stuart D. Jordan, NASA astrophysicist emeritus
Barry Karr, executive director, Committee for Skeptical Inquiry, Amherst, NY
Edwin C. Krupp, astronomer; director, Griffith Observatory, Los Angeles, CA
Lawrence Kusche, science writer
Stephan Lewandowsky, psychologist, School of Experimental Psychology and Cabot Institute, Univ. of Bristol, UK
Scott O. Lilienfeld,* psychologist, Emory Univ., Atlanta, GA
Lin Zixin, former editor, *Science and Technology Daily* (China)
Jere Lipps, Museum of Paleontology, Univ. of California, Berkeley
Elizabeth Loftus,* professor of psychology, Univ. of California, Irvine
Daniel Loxton, author; editor of *Junior Skeptic* at *Skeptic* magazine (US); artist, Vancouver, B.C., Canada
Michael E. Mann, Distinguished Professor of Atmospheric Sciences and director of the Earth Systems Sciences Center, Pennsylvania State University
David Marks, psychologist, City Univ., London
Mario Mendez-Acosta, joumalist and science writer, Mexico City
Kenneth R. Miller, professor of biology, Brown Univ.
David Morrison, space scientist, NASA Ames Research Center
Richard A. Muller, professor of physics, Univ. of California, Berkeley
Joe Nickell, senior research fellow, CSI
Jan Willem Nienhuys, mathematician, Waalre, the Netherlands
Lee Nisbet, philosopher, Medaille College
Steven Novella,* MD, assistant professor of neurology, Yale Univ. School of Medicine
Bill Nye, science educator and television host, Nye Labs
James E. Oberg, science writer
Paul Offit, professor of pediatrics, director of the Vaccine Education Center, the Children's Hospital of Philadelphia
Naomi Oreskes, geologist and professor, Departments of the History of Science and Earth and Planetary Sciences, Harvard Univ., Cambridge, MA
Loren Pankratz, psychologist, Oregon Health Sciences Univ.
Robert L. Park, emeritus professor of physics, Univ. of Maryland
Jay M. Pasachoff, professor of astronomy and director of Hopkins Observatory, Williams College
John Paulos, mathematician, Temple Univ.
Clifford A. Pickover, scientist; author; editor, IBM T.J. Watson Research Center.
Massimo Pigliucci, professor of philosophy, City Univ. of New York–Lehman College
Steven Pinker, cognitive scientist, Harvard Univ.
Massimo Polidoro, science writer; author; executive director of CICAP, Italy
James L. Powell, geochemist; author; executive director, National Physical Science Consortium
Anthony R. Pratkanis, professor of psychology, Univ. of CA, Santa Cruz
Donald R. Prothero, paleontologist/geologist, Natural History Museum of Los Angeles County, Los Angeles, CA
Benjamin Radford, investigator; research fellow, Committee for Skeptical Inquiry
James "The Amazing" Randi, magician; CSICOP founding member; founder, James Randi Educational Foundation
Milton Rosenberg, psychologist, Univ. of Chicago
Amardeo Sarma,* chairman, GWUP, Germany
Richard Saunders, Life Member, Australian Skeptics; educator; investigator; podcaster; Sydney, Australia
Joe Schwarcz, director, McGill Office for Science and Society
Eugenie C. Scott,* physical anthropologist; chair, advisory council, National Center for Science Education
Seth Shostak, senior astronomer, SETI Institute, Mountain View, CA
Simon Singh, science writer; broadcaster; UK
Dick Smith, entrepreneur; publisher; aviator; adventurer, Terrey Hills, N.S.W., Australia
Keith E. Stanovich, cognitive psychologist, professor of applied psychology, Univ. of Toronto
Karen Stollznow,* linguist; skeptical investigator; writer; podcaster
Jill Cornell Tarter, astronomer, SETI Institute, Mountain View, CA
Carol Tavris, psychologist and author, Los Angeles, CA
David E. Thomas,* physicist and mathematician, Socorro, NM
Neil deGrasse Tyson, astrophysicist and director, Hayden Planetarium, New York City
Indre Viskontas, cognitive neuroscientist; TV and podcast host; opera singer, San Francisco, California
Stuart Vyse, psychologist, former Joanne Toor Cummings '50 professor of psychology, Connecticut College
Marilyn vos Savant, *Parade* magazine contributing editor
Steven Weinberg, professor of physics and astronomy, Univ. of Texas at Austin; Nobel laureate
E.O. Wilson, Univ. professor emeritus, organismic and evolutionary biology, Harvard Univ.
Richard Wiseman, psychologist, Univ. of Hertfordshire, England
Benjamin Wolozin, professor, Department of Pharmacology, Boston Univ. School of Medicine

*Member, CSI Executive Council
(Affiliations given for identification only.)

The Skeptical Inquirer (ISSN 0194-6730) is published bimonthly by the Center for Inquiry in association with the Committee for Skeptical Inquiry, P.O. Box 703, Amherst, NY 14226. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at additional mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $5.99. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$14 per year for shipping. Canadian and foreign customers are encouraged to use Visa or Master Card.

Inquiries from the media and the public about the work of the Committee should be made to Barry Karr, Executive Director, CSI, P.O. Box 703, Amherst, NY 14226-0703. Tel.:716-636-1425. Fax: 716-636-1733. Email: bkarr@centerforinquiry.org

Manuscripts, letters, books for review, and editorial inquiries should be sent to Kendrick Frazier, Editor, Skeptical Inquirer, EMAIL: kendrickfrazier@comcast.net. Mail: 944 Deer Drive NE, Albuquerque, NM 87122. Please consult our Guide for Authors for style, reference, and submittal instructions. It is on our website at www.skepticalinquirer.org/publications/guide.

Articles, reports, reviews, and letters published in the Skeptical Inquirer represent the views and work of individual authors. Their publication does not necessarily constitute an endorsement by CSI or its members unless so stated.

Copyright ©2019 by the Center for Inquiry and the Committee for Skeptical Inquiry. All rights reserved.

Subscriptions and changes of address should be addressed to: Skeptical Inquirer, P.O. Box 703, Amherst, NY 14226-0703 or call toll-free 1-800-634-1610 (outside the U.S. call 716-636-1425). Old address as well as new is necessary for change of address, with ten weeks advance notice. Skeptical Inquirer subscribers may not speak on behalf of CSI or the Skeptical Inquirer.

Postmaster: Send changes of address to Skeptical Inquirer, P.O. Box 703, Amherst, NY 14226-0703.

A PROGRAM OF CENTER FOR INQUIRY

Skeptical Inquirer September/October 2019 | Vol. 43, No. 5

THE HEALTH WARS: IN THE TRENCHES AGAINST ALTERNATIVE MEDICINE

30
The Remedies of National Geographic
The National Geographic Society has published a series of books about "natural healing remedies." They are full of claims that lack scientific evidence, are inconsistent and internally contradictory, and don't reach even minimal scientific standards. The NGS should reconsider them.
VICTOR BENSON

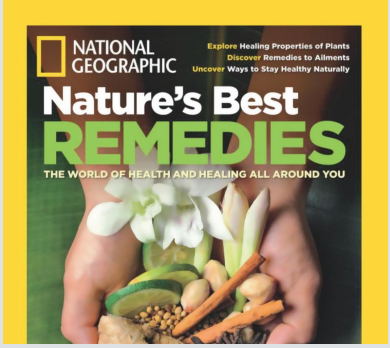
37
National Geographic Book Is a 'Natural' Disaster
HARRIET HALL

39
Quackery at WHO: A Chinese Affair
China has aggressively and successfully introduced its prescientific traditional medicine into the World Health Organization (WHO).
CEES N.M. RENCKENS AND THOMAS P.C. DORLO

44
Magic Waters
There is a long history of belief in the supposed "magical" powers of water. Some are "natural" attributes considered miraculous, talismanic, or legendary; others involve waters supposedly "imbued" with "energy" or "powers" such as memory (homeopathy). All are examples of magical, supernatural thinking trumped by science.
JOE NICKELL

50
Laser Acupuncture: High-Tech Placebo
Its proponents may have hijacked a high-tech tool, but laser acupuncture has no more scientific validity than acupuncture with needles.
SÉBASTIEN POINT

52
The New Phrenology
Trauma researchers, using modern imaging, have attempted to link psychiatric disorders to child abuse by demonstrating smaller hippocampal volumes. The studies differ little from those of nineteenth-century phrenology.
ROBERT STERN


NATIONAL GEOGRAPHIC
Explore Healing Properties of Plants
Discover Remedies to Ailments
Uncover Ways to Stay Healthy Naturally
Nature's Best
REMEDIES
THE WORLD OF HEALTH AND HEALING ALL AROUND YOU

57
Unskeptical: Indian Scientists' Opinions of Ayurvedic Medicine
Ayurvedic medicine is so deeply imbued into Indian culture that even most scientists in India strongly support it, according to a survey of 1,100 Indian scientists. This mostly exempts it from critical scrutiny.
BARRY A. KOSMIN

60
Suing for Science
Why the Center for Inquiry chose homeopathy for its first court cases challenging any of the forms of pseudoscience that plague society.
NICHOLAS J. LITTLE

COLUMNS

FROM THE EDITOR
The Health Wars: Fighting Medical Pseudoscience 4

NEWS AND COMMENT
CFI Sues Walmart for Fraud for Selling Homeopathic Fake Medicine / FDA Warns Five Homeopathic Manufacturers / CNN Reporters Awarded Balles Critical Thinking Prize for *A Deal with the Devil* / Google Funds Cold Fusion Research; Results Still Negative / Welcome News on Global Attitudes toward Science and Health from Wellcome / In Memory of Murray Gell-Mann, Who Gave Us Quarks and Ordered the Subatomic World / Old FBI Documents Reveal Mundane Bigfoot 'Investigation' / Credulous Flying Saucer 'Expert' Stanton T. Friedman Dead at Eighty-Four 5

INVESTIGATIVE FILES
Gloucester Sea-Serpent Mystery: Solved after Two Centuries
JOE NICKELL 14

NOTES ON A STRANGE WORLD
The Trapped Ghost
MASSIMO POLIDORO 17

REALITY IS THE BEST MEDICINE
Opioids: The Good, the Bad, and the Ugly
HARRIET HALL 19

BEHAVIOR & BELIEF
The New Wave of Exorcism
STUART VYSE 22

THE SCIENCE OF SCIENCE COMMUNICATION
Science and Society Beliefs across the Globe: A Study of Fifty-Four Countries Assesses Public Optimism and Reservations
MATTHEW C. NISBET 25

SKEPTICAL INQUIREE
Subliminal Advertising, Trumpian and Otherwise
BENJAMIN RADFORD 28

NEW AND NOTABLE 66

LETTERS TO THE EDITOR 68

REVIEWS

Countering the Pseudoscience in Psychotherapy for the Young
HARRIET HALL 64
Pseudoscience in Child and Adolescent Psychotherapy: A Skeptical Field Guide. Edited by Stephen Hupp

Chernobyl and the Future of Nuclear Energy
DAVID MORRISON 65
Chernobyl. Created and written by Craig Manzin. Directed by Johan Renck.

Committee for Skeptical Inquiry
"... promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims."

[FROM THE EDITOR

The Health Wars: Fighting Medical Pseudoscience

We present in this special, expanded issue seven timely articles on "The Health Wars: In the Trenches against Alternative Medicine." So-called alternative medicine (or SCAM, the telling acronym used by medical scientist Edzard Ernst as the title of his most recent book) is all around us. It has managed to imbed itself into medical institutions, pharmacies, media, woo-woo culture, and beyond. It is many different things. This makes it difficult to criticize effectively. Ernst, one of our distinguished CSI fellows, notes that he has published "more papers on alternative medicine than any other researcher on the planet—and yet, I have never come across an alternative therapy that clearly and demonstrably outperforms conventional medicine." This was quoted in our previous issue in a marvelous column ("Science Envy in Alternative Medicine," July/August 2019) by physician and SI contributing editor and columnist Harriet Hall. A key passage by Hall in that column could serve as an introduction to this special issue of SI: "Alternative medicine embraces many things: treatments that have never been tested or have not been adequately tested; treatments that have been tested and shown *not* to work; treatments that are based on nonexistent phenomena such as human energy fields and acupoints; treatments such as homeopathy that would violate established scientific knowledge; and treatments that have been proven to work but that mainstream doctors have good reasons not to recommend."

The articles in this issue make no attempt to cover the whole field of alternative medicine, as if that were even possible. They instead focus on some specific, even surprising, topics. Where they concern subjects we've written about before, they are of new manifestations or new promulgators. Our lead article is a good example.

We have all long admired and trusted *National Geographic* magazine. Its articles and photographs cover the world with great insight, and the magazine's editors haven't shied away from difficult topics. What are we to make, then, of six books and newsstand "book-azines" on natural healing remedies published by the National Geographic Society? Physician Victor Benson examines them all in this issue and finds that while they may have a few good qualities, they "are full of claims that lack evidence" and "don't even meet minimum scientific standards." The National Geographic Society should not sully its reputation with them, he says. In her own succinct review of the latest and longest of these books, Harriet Hall calls it "a bitter disappointment," "unreliable," "misleading, incomplete, and potentially dangerous," and "a 'natural' disaster." How did the National Geographic Society let this happen?

Medical researchers Cees N.M. Renkens and Thomas P.C. Dorlo of the Dutch Society Against Quackery return to our pages with the latest about the World Health Organization's shameless embrace of traditional Chinese medicine, incorporating TCM into its forthcoming eleventh edition of *International Classification of Diseases*, slated to go into effect in 2022. This means that the world's doctors may then report diagnoses such as *bladder meridian syndrome* and *triple energized meridian dysfunction*! ("Meridians" don't exist except in the minds of TCM proponents.) We also now have "laser acupuncture," as French physicist Sébastian Point describes in this issue, another "hijacking" of a modern technology by an ancient pseudoscience.

And so it goes. An endless parade of misleading and even nonsensical medical claims gussied up as real science and fooling not just the gullible but countless millions of well-meaning others worldwide. It seems typical of our times.

—Kendrick Frazier

Skeptical Inquirer™
THE MAGAZINE FOR SCIENCE AND REASON

EDITOR Kendrick Frazier
DEPUTY EDITOR Benjamin Radford
MANAGING EDITOR Julia Lavarnway
ASSISTANT EDITOR Nicole Scott
ART DIRECTOR Christopher Fix
WEBMASTER Marc Kreidler
PUBLISHER'S REPRESENTATIVE Barry Karr

EDITORIAL BOARD James E. Alcock, Harriet Hall, Ray Hyman, Scott O. Lilienfeld, Elizabeth Loftus, Joe Nickell, Steven Novella, Amardeo Sarma, Eugenie C. Scott, Karen Stollznow, David E. Thomas, Leonard Tramiel

CONSULTING EDITORS Susan J. Blackmore, Kenneth L. Feder, Barry Karr, E.C. Krupp, Jay M. Pasachoff, Richard Wiseman

CONTRIBUTING EDITORS Harriet Hall, David Morrison, Matthew C. Nisbet, Massimo Pigliucci, David E. Thomas, Stuart Vyse

Published in association with
CENTER FOR INQUIRY
CHAIR Edward Tabash
PRESIDENT AND CEO Robyn E. Blumner
CHIEF FINANCIAL OFFICER Barry Karr
CORPORATE COUNSEL Nicholas J. Little, Brenton Ver Ploeg
SUBSCRIPTION DATA MANAGER Jacalyn Mohr
COMMUNICATIONS DIRECTOR Paul Fidalgo
DIRECTOR OF LIBRARIES Timothy S. Binga
VICE PRESIDENT FOR PHILANTHROPY Martina Fern
EXECUTIVE DIRECTOR, RICHARD DAWKINS FOUNDATION FOR REASON & SCIENCE Robyn E. Blumner
DIRECTOR, DIGITAL PRODUCT AND STRATEGY Marc Kreidler
DIRECTOR, GOVERNMENT AFFAIRS Jason Lemieux
SYSTEM ADMINISTRATOR Cody Hashman
DIRECTOR, TEACHER INSTITUTE FOR EVOLUTIONARY SCIENCE Bertha Vazquez

BOARD OF DIRECTORS Edward Tabash (chair), David Cowan, Richard Dawkins, Brian Engler, Kendrick Frazier, Barry A. Kosmin, Y. Sherry Sheng, J. Anderson Thomson Jr., Leonard Tramiel. *Honorary:* Rebecca Newberger Goldstein, Susan Jacoby.

STAFF Pat Beauchamp, Melissa Braun, Matthew Cravatta, Lauren Foster, Roe Giambrone, Melissa Myers, Alexander Nicaise, Paul Paulin, Michael Powell, Vance Vigrass

CFI Mission: The Center for Inquiry strives to foster a secular society based on reason, science, freedom of inquiry, and humanist values.
Our Vision: A world where people value evidence and critical thinking, where superstition and prejudice subside, and where science and compassion guide public policy.
Our Values: Integrity, Courage, Innovation, Empathy, Learning, and Wonder.

CFI Sues Walmart for Fraud for Selling Homeopathic Fake Medicine

PAUL FIDALGO

Walmart is committing wide-scale consumer fraud and endangering the health of its customers through its sale and marketing of homeopathic medicines, the Center for Inquiry (CFI) alleges in a lawsuit filed in the District of Columbia on May 20.

CFI says the mega-retailer is deceiving consumers by making no meaningful distinction between real medicine and useless homeopathic treatments on its shelves and in its online store, misrepresenting homeopathy's safety and efficacy. CFI is currently engaged in a similar suit against CVS, the nation's largest drug retailer, filed in June 2018 ("Center for Inquiry Sues CVS Pharmacies for Marketing of 'Sham' Homeopathy," SI, November/December 2018). It is still ongoing.

"Walmart sells homeopathics right alongside real medicines, in the same sections in its stores, under the same signs," said Nicholas Little, CFI's vice president and general counsel. "Searches on its website for cold and flu remedies or teething products for infants yield pages full of homeopathic junk products. It's an incredible betrayal of customers' trust and an abuse of Walmart's titanic retail power." (See Little's article "Suing for Science," p. 60.)

Homeopathy is an eighteenth-century pseudoscience premised on the unscientific notion that a substance that causes a particular symptom is what should be ingested to alleviate it. Dangerous substances are diluted to the point that no trace of the active ingredient remains, but its alleged effectiveness rests on the nonsensical claim that water molecules have "memories" of the original substance. Homeopathic treatments have no effect whatsoever beyond that of a placebo. "Walmart can't claim it doesn't know that homeopathy is snake oil, because it runs its own enormous pharmacy business and makes its own homeopathic products," said Little. "So whether it's a scientifically proven remedy like aspirin or flatly denounced junk like homeopathic teething caplets for babies, Walmart sells all of it under its in-house 'Equate' branding. It's all the same to Walmart."

Choosing homeopathic treatments to the exclusion of evidence-based medicines can result in worsened or prolonged symptoms—and in some cases even death. Several products have been found to contain poisonous ingredients that have affected tens of thousands of adults and children in just the past few years. As recently as May 14, the Food and Drug Administration (FDA) issued warnings to five manufacturers of homeopathic products for numerous safety violations. (See next story.)

Walmart is committing wide-scale consumer fraud and endangering the health of its customers through its sale and marketing of homeopathic medicines.

"Despite being among the richest corporations on Earth and the largest retailer in the United States, Walmart chooses to further pad its massive wealth by tricking consumers into throwing their money away on sham medicinal products that are scientifically proven to be useless and potentially dangerous," said Robyn Blumner, president and CEO of the Center for Inquiry. "We intend to put a stop to it."

The official complaint is on the CFI website, centerforinquiry.org.

CFI has lobbied for tighter regulation of homeopathic products for many years, becoming the leading advocate for science-based medicine and against the proliferation of snake oil. In 2015, CFI was invited by the FDA and the Federal Trade Commission (FTC) to provide expert testimony. As a result, the FTC declared in 2016 that the marketing of homeopathic products for specific diseases and symptoms is acceptable only if consumers are told: "(1) there is no scientific evidence that the product works and (2) the product's claims are based only on theories of homeopathy from the 1700s that are not accepted by most modern medical experts." In 2017, the FDA announced a new "risk-based" policy of regulatory action against homeopathic products.

CFI announced July 10 that the Stiefel Freethought Foundation is adding $150,000 to the $100,000 already committed to help underwrite CFI's consumer fraud cases against Walmart and CVS. Activist and philanthropist Todd Stiefel, a former executive of Stiefel Laboratories, is also providing expert advice and guidance. The Stiefel Foundation has now provided $250,000 to fund CFI's legal efforts against homeopathy marketing. CFI gratefully acknowledges the Stiefel Freethought Foundation and its ongoing support of this work.

Paul Fidalgo is CFI's communications director.

FDA Warns Five Homeopathic Manufacturers

The U.S. Food and Drug Administration (FDA) in May posted warning letters to five companies that produce products labeled as homeopathic. It accused them of significant violations of current good manufacturing practice regulations.

The FDA noted that it has not approved products labeled as homeopathic for any use.

Four of the warning letters pertain to companies that jointly produced a product labeled as homeopathic that posed a significant safety risk to consumers because their purportedly sterile products were not shown to be sterile. An additional letter outlined a company's failure to have systems in place to assure proper design, monitoring, and control of manufacturing processes. The FDA announced the warnings May 14, 2019.

"It's our public health obligation to protect consumers from unsafe products. Our manufacturing requirements are designed to ensure the quality and safety of drugs distributed to American consumers, and the FDA expects companies to manufacture and label their products appropriately," said FDA Acting Commissioner Ned Sharpless, MD. "When products labeled as homeopathic are contaminated or contain potentially harmful ingredients, we will take action so consumers are not put at risk."

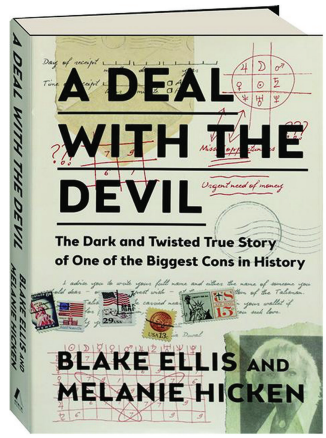
The FDA noted that it has not approved products labeled as homeopathic for any use and that they may not meet modern standards for safety, effectiveness, and quality. "These unapproved drugs may cause significant and even irreparable harm if they are poorly manufactured, which can lead to contamination, or may contain active ingredients that are not adequately tested or disclosed to patients." The warning letters went to Kadesh Inc., U.S. Continental Marketing, Inc., Fill It Pack It, Inc., and Bershtel Enterprises LLC, doing business as WePackItAll. They all describe failures to conform to regulations due to improper methods, facilities, or controls for manufacturing, processing, and packing.

Earlier this year, the FDA issued separate warning letters to additional companies regarding products in violation of its regulations and labeled as homeopathic. On April 1, the FDA warned homeopathic firms for putting consumers at risk with significant violations of manufacturing quality standards, and on March 19, they took action against a marketer of unapproved products claiming to treat addiction, chronic pain, and other ailments.

In December 2017, the FDA proposed a risk-based enforcement approach. The approach prioritizes enforcement and regulatory actions of products labeled as homeopathic and marketed without the required FDA approval that have the greatest potential to cause risk to consumers ("FDA to Regulate Some Homeopathic Products; CFI Hails Move," Skeptical Inquirer, March/April 2018).

CNN Reporters Awarded Balles Critical Thinking Prize for *A Deal with the Devil*

Paul Fidalgo



In their book *A Deal with the Devil: The Dark and Twisted True Story of One of the Biggest Cons in History*, investigative reporters Blake Ellis and Melanie Hicken exposed the complex inner workings of a case of psychic fraud that spanned several decades and bilked over $200,000,000 from the mostly elderly victims. Their tale reveals how easy it is for anyone to be taken in by con artists and how seemingly small scams can explode into something much bigger and far more sinister. For their achievement, they have been awarded the 2018 Robert P. Balles Annual Prize in Critical Thinking by the Committee for Skeptical Inquiry (CSI).

A Deal with the Devil emerged from Ellis and Hicken's fraud investigations for CNN Money. They found that many elderly Americans had been giving away enormous sums of money to a woman named Maria Duvall who claimed to have psychic powers. Through personalized letters, Duvall made promises to grant the recipients health and riches—if they sent her money. "The letters appealed to the most base emotions of fear, loneliness, and hope—making it nearly impossible for victims to resist," wrote Ellis and Hicken, who discovered that the scam was much bigger than letters from a sketchy

psychic. What Ellis and Hicken revealed is an enterprise in consumer fraud on a massive scale, involving the buying and selling of personal information from data brokers, the emotional manipulation of vulnerable populations, and even the adoption and expansion of the con by organized crime.

"It's easy to think of psychic scams as mostly harmless, taking in only a few gullible folks who we think should have known better," said Barry Karr, executive director of the Committee for Skeptical Inquiry. "*A Deal with the Devil* reminds us just how sophisticated these cons can be and how all of us have the potential to fall victim to emotional manipulation."

"In an age of alternative facts misinformation," said Karr, "*A Deal with the Devil* has broken the ice on some badly needed discussions about the need for critical thinking."

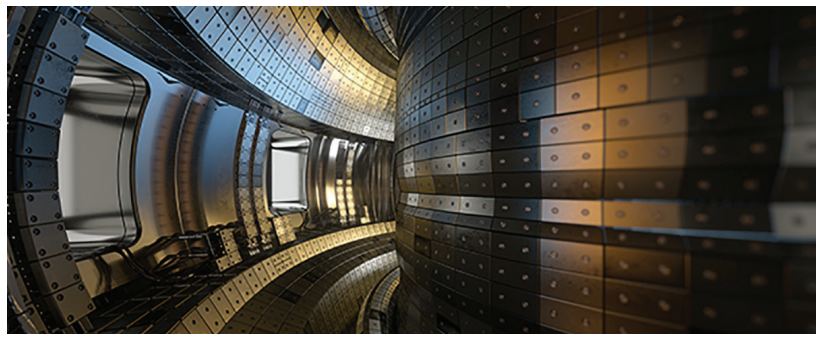
What Ellis and Hicken revealed is an enterprise in consumer fraud on a massive scale.

The Robert P. Balles Annual Prize in Critical Thinking is bestowed by the Committee for Skeptical Inquiry, publisher of Skeptical Inquirer magazine and a program of the Center for Inquiry. Ellis and Hicken will receive the prize at the CSICon convention October 16–20, 2019, in Las Vegas, which will also feature speakers such as John de Lancie, Brian Greene, Richard Dawkins, Julia Sweeney, and many more. See csiconference.org for more information.

The Balles Prize is a $2,500 award given to the creator of the published work that best exemplifies healthy skepticism, logical analysis, or empirical science. The prize was established by Robert P. Balles, a practicing Christian, along with the Robert P. Balles Endowed Memorial Fund, a permanent endowment fund for the benefit of CSI. The winners of the 2017 Balles Prize were Donald R. Prothero and Tim Callahan for their book *UFOs, Chemtrails, and Aliens*.

Google Funds Cold Fusion Research; Results Still Negative

David W. Ball



The venerable science publication *Nature* revealed in May 2019 that the internet technology company Google funded research in cold fusion to the tune of about $10 million. A group of scientists from reputable institutions—MIT, Lawrence Berkeley National Lab, the University of British Columbia, the Canadian Institute for Advanced Research, and the University of Maryland—worked for several years to establish experimental protocols and measurement techniques in an effort to "re-evaluate cold fusion to a high standard of scientific rigour." Their conclusion so far? No cold fusion (still).

Although the term *cold fusion* was coined in the 1950s, the concept made headlines in March 1989. Two electrochemists at the University of Utah, Stanley Pons and Martin Fleishmann, announced in a press conference that they had achieved nuclear fusion of deuterium absorbed by palladium electrodes in an electrochemical cell, rather than in the extreme conditions of temperature and pressure usually required (hence the use of the adjective *cold*). The announcement caused a worldwide wave of attempts to reproduce and characterize the phenomenon. Despite the claims of repetition and production of excess heat (the main apparent product of the cold fusion), results were scattered, irreproducible, and mostly negative. (See my article "Cold Fusion: Thirty Years Later," SI, January/February 2019.) Most physical scientists who have studied the work accept that cold fusion does not exist in any reasonable sense, although a small group of devotees continue to pursue experiments in this area.

Funding agencies are certainly within their right to fund projects that fit their scope of interests, but support for work that has been clearly debunked gives credence to fringe science.

The current team admits "… we have found no evidence of anomalous effects claimed by proponents of cold fusion that cannot otherwise be explained prosaically." But in the very next sentence, they hedge:

> However, our work illuminates the difficulties of producing the conditions under which cold fusion is hypothesized to exist. This result leaves open the possibility that the debunking of cold fusion in 1989 was perhaps premature because the relevant physical and material conditions

had not (and indeed have not yet) been credibly realized and thoroughly investigated.

They further argue that there may be "good technical reasons why proponents of cold fusion have struggled to detect anomalous effects reliably and reproducibly." The "Perspective" paper (defined as a "technical opinion piece" by the journal editors) published in the May 30, 2019, *Nature* then discusses issues involving the absorption of hydrogen isotopes by palladium as well as the challenges in constructing reliable calorimetric techniques for measuring energy into and out of an electrochemical cell. But then they concede "none of the 420 samples we evaluated provided evidence of excess heat; the COPs [coefficients of performance, a measure of the ratio of energy out to energy into the calorimeter] measured in our experiments were consistently unity"—that is, there was no excess energy production.

Nowhere in the paper do the authors indicate that they are aware of the event that essentially started the cold fusion affair at the University of Utah: an electrochemical cell, operating unattended overnight in a basement lab, exploded during the night with such force that the concrete floor of the lab was damaged. Pons and Fleischmann could think of no other source of so much energy other than a nuclear reaction. (Really? Not a short circuit in the cell? Not an explosion of built-up hydrogen gas? No, it *must* have been a nuclear reaction!) That incident led them to try other cells with the explicit goal of detecting nuclear processes. This ultimately resulted in an announcement of new science by press conference, which was followed by a paper published in an electrochemical journal that was of such dubious use that experts in nuclear science immediately called it out. But because of the claim of easy, cheap, and copious energy, scientists and engineers around the world worked to replicate and understand it. Their efforts produced inconsistent results at best and negative results at worst. After several scientific and government conferences on the topic, most scientists and engineers accept the evidence that cold fusion, as claimed by Pons and Fleischmann and their supporters, does not occur and is an example of pathological science.

Why would Google fund a project in an area that most credible scientists argue is clearly unsupported by evidence? The reality is that for Google, $10 million is pocket change, and they can certainly stand to spend that much in research that has very low odds of success. Perhaps they are balancing that against the possibility that some useful knowledge may come out of the research. Indeed, an editorial in that issue of *Nature* touts just that: The research discovered new issues in metal hydrides and calorimetry that justify the work, both the article and the editorial claim.

Should funding for claims such as this continue? One could argue that studies of metal hydrides and extreme-condition calorimetry are important in their own right, independent of their application to cold fusion. Funding agencies are certainly within their right to fund projects that fit their scope of interest; the John Templeton Foundation is one example. At the same time, significant support for work that has been clearly debunked gives credence to fringe science. What's next? Research support for studying the flat earth, autism-causing vaccines, and intelligent design? ("After all, yesterday's fringe ideas are today's science facts!") Maybe funding agencies should be using Carl Sagan's baloney detection kit. Given the dearth of funding for scientific research that has a demonstrably better outlook for success, perhaps funders should be more, ah, skeptical in where they provide support.

David W. Ball is a professor of chemistry at Cleveland State University. He published a thirty-year retrospective of cold fusion in the January/February 2019 Skeptical Inquirer.

Welcome News on Global Attitudes toward Science and Health from Wellcome

Glenn Branch

The results of Wellcome Global Monitor 2018, a massive survey on public attitudes toward science and health, were released June 19, 2019. The Wellcome Trust in the U.K. commissioned this survey from Gallup.

Among the topics investigated were understanding of (and interest in) science and health, level of trust in science and health professionals, attitudes toward science and society (with particular attention to science and religion), and views on the effectiveness and safety of vaccines. The study was unprecedented in scale, conducted in more than 140 countries and more than 140 languages through direct interviews with more than 140,000 people. While there clearly are reasons for concern and room for improvement, the results were overall encouraging.

Asked how much they personally know about science, only 43 percent of people globally said that they knew "a lot" or "some."

With the exception of vaccines, people were not asked about specific topics in science. Questions intended to assess understanding of such topics, including the evolution of antimicrobial resistance, were considered but not contained in the final survey instrument due to the difficulty of translating scientific terms into the local languages and to the deterrent effect of seeming to quiz the lay respondents. Even the survey's definition of science as "the

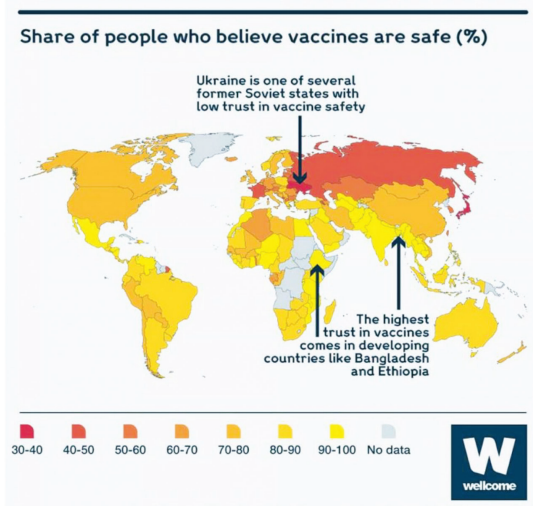
understanding we have about the world from observation and testing" was not fully understood by a significant minority (20 percent globally), although a large majority (81 percent globally) accepted that studying disease is part of science.

Asked how much they personally know about science, only 43 percent of people globally said that they knew "a lot" (6 percent) or "some" (37 percent) about science. These results varied by country, with people in richer countries tending to rank their knowledge of science higher: 79 percent of those in the United States said they know a lot or some about science. Younger people, people with more education, and men were more likely to rank their knowledge of science higher than older people, people with less education, and women. Globally, 62 percent of people expressed interest in learning more about science, and 72 percent of people expressed interest in learning more about health.

Trust in scientists and medical professionals is generally high: 72 percent of people globally expressed a high (18 percent) or medium (54 percent) level of trust in scientists (as assessed by a composite of five survey questions), while 84 percent of people globally said that they have "a lot" (41 percent) or "some" (43 percent) trust in doctors and nurses. At the individual level, the most influential predictor of trust in scientists was studying science in school; at the country level, people in countries with higher levels of inequality were less likely to trust scientists. Doctors and nurses are generally trusted globally, especially in high-income areas such as western Europe, Australia, New Zealand, and northern Europe.

Using responses to two questions, Wellcome's report distinguished four views on the benefits of science among the respondents globally. Enthusiasts (38 percent) said that science benefits both people like them and most people in their country; the Included (29 percent) said that science benefits people like them but not most people in their country; the Excluded (11 percent) said that science benefits some or most people in their country but not people like them; and the (regrettably named) Sceptics (8 percent) said that science benefits neither people like them nor most people in their country. (The remaining 15 percent failed to answer both questions.) Those seeing no benefits from science were particularly common in Central and South America.

Globally, 92 percent of people strongly or somewhat agreed that it is important for children to be vaccinated.



Globally, 61 percent of people—73 percent if one excludes people in the atypically irreligious China—said that religion is important in their daily lives. Asked whether science has ever disagreed with the teachings of their religion, only 29 percent of people globally answered in the affirmative. Of these, more than half—55 percent globally and 60 percent in the United States—said that they would side with their religion in the event of such a disagreement, while 29 percent globally and 32 percent in the United States said they would side with science. Men and older people were generally more likely than women and younger people to take the side of science, although there was considerable regional variation.

As for vaccines—which Wellcome's report correctly describes as "a vitally important application of scientific research that save millions of lives worldwide every year"—79 percent of people globally agreed strongly (61 percent) or somewhat (18 percent) that they are safe, with only 7 percent somewhat or strongly disagreeing, and 84 percent of people globally agreed strongly (63 percent) or somewhat (21 percent) that they are effective, with only 5 percent somewhat or strongly disagreeing. Globally, 92 percent of people strongly or somewhat agreed that it is important for children to be vaccinated. Overall, there was no clear relationship between level of science education and confidence in vaccines.

With a questionnaire that occupied (in its English-language version) eleven pages, a detailed report (available online at https://wellcome.ac.uk/sites/default/files/wellcome-global-monitor-2018.pdf) that runs 132 pages, and over six megabytes of raw data from the survey archived at the UK Data Service, it's clear that Wellcome Global Monitor 2018 was a comprehensive effort. As Wellcome's director writes in his foreword to the report, the study's findings "can inform the development of policies to increase trust and engagement between scientists and society"—which are surely going to be conducive to the aim of increasing understanding, acceptance, and appreciation of science.

For more perspective, see Matthew Nisbet's column in this issue.

Glenn Branch is deputy director of the National Center for Science Education.

In Memory of Murray Gell-Mann, Who Gave Us Quarks and Ordered the Subatomic World

Kendrick Frazier

Murray Gell-Mann, the brilliant physicist who won the Nobel Prize in physics a half-century ago when he was barely forty years old, died May 24, 2019, at his home in Santa Fe, New Mexico. He was eighty-nine.

Gell-Mann helped develop the "standard model" of particle physics. He introduced the concept of quantum "strangeness." He brought order to the world of subatomic physics by grouping all particles into eight characteristics, a system he named the "Eightfold Way." To account for these characteristics, he came up with the then-revolutionary idea of particles with fractional electric charge, and he called them "quarks," a name he whimsically took from James Joyce's *Finnegans Wake*. Experiments subsequently confirmed the existence of quarks. His 1969 Nobel Prize citation read: "For his contributions and discoveries concerning the classification of elementary particles and their interactions."

Murray Gell-Mann posing with a painting of Isaac Newton in Science Hall, Beijing China, October 2007. (Photo by K. Frazier)

Gell-Mann, born in New York City in 1929, was a child prodigy. He received his PhD at MIT in 1951 and spent most of his research career at Caltech. He was known for his range and depths of interests and knowledge. Late in his career he moved to Santa Fe and in 1984 helped found the Santa Fe Institute (SFI), where scientists from many disciplines study frontier topics surrounding the idea of complexity, a concept common to fields including biology, ecology, sociology, and computer science.

At SFI he actively researched the evolution of human languages, archaeology, other aspects of human history, and even economics.

His 1994 book *The Quark and the Jaguar* united his views about the simple and the complex. Quarks, as he said, were "the basic building blocks of all matter," and jaguars, while built of quarks and electrons, exhibit "an enormous amount of complexity, the result of billions of years of biological evolution."

David Krakauer, president of the Santa Fe Institute, called Gell-Mann a "polymath … a mind both cavernous and extensive—animated by the most intense fire of roguish curiosity that I have ever beheld."

The novelist Cormac McCarthy, a longtime Gell-Mann friend and a fellow at the Santa Fe Institute, said, "Losing Murray is like losing the Encyclopedia Britannica. He knew more things about more things than anyone I've ever met."

"Murray Gell-Mann was a seminal figure in the history of physics," Thomas Rosenbaum, a physicist and president of Caltech, said in a statement. "A polymath, a discerner of nature's fundamental patterns, and, as such, an expositor for the connections of physics to other disciplines. Murray helped define the approaches of generations of scientists."

"Murray Gell-Mann was a seminal figure in the history of physics."

—Thomas Rosenbaum, physicist and president of Caltech

In addition to his many other scientific honors, in 1985 the Executive Council of CSICOP, predecessor of the Committee for Skeptical Inquiry, elected Gell-Mann a fellow (SI, Summer 1985). He was always a strong proponent of rationality and evidence-based thinking. He spoke at CSICOP's 1987 Pasadena conference, where at the evening awards banquet he was given CSICOP's Frontiers of Science and Technology Award while Carl Sagan was given its In Praise of Reason Award. An SI report on the conference (Fall 1987) said Gell-Mann also gave magician/entertainers Penn and Teller a little help with their show at the conference as "an assistant."

In October 2007, Gell-Mann was a featured speaker at the Center for Inquiry's congress on Scientific Inquiry and Human Well-Being in Beijing, China, a conference cosponsored by the China Research Institute for Science Popularization (CRISP).

In respectful remembrance, we here present the summary of his remarks we published at the time and a photo we took of him in the hallway of the Science Hall there in front of a portrait of Sir Isaac Newton.

Gell-Mann: Reality Is Out There … and It's Beautiful

From the March/April 2008 Skeptical Inquirer

In case you were wondering, there really is a reality out there independent of human observers. That point—often disputed in deep philosophical discussions by the intellectual cognoscenti—comes from one who has accomplished his own deep investigations into the fundamental realms of physical reality: physicist and CSI Fellow Murray Gell-Mann, who won the 1969 Nobel Prize in physics for his work leading up to the discovery of the quark, which he predicted and named.

Gell-Mann spoke at the [CFI] China conference opening plenary session on "Is Nature Conformable to Itself?" But before launching into that topic, he fired some arrows at certain enemies of science. He cited "a number of tendencies" toward "hostility to science" among fundamentalists, governments, and postmodern scholars. As for the latter, he said, "I call them 'post-rational' or 'post-intelligent.'"

The laws of physics "are out there," Gell-Mann emphasized. "These laws are not just created by the human mind."

It is scientists' job to discover them, and beauty, he said, as did Einstein, is a guide to truth. "What is especially striking and remarkable is that in fundamental physics a beautiful or elegant theory is more likely to be right than a theory that is inelegant."

What do we mean by beauty of elegance? "A theory appears beautiful or elegant—or simple, if you prefer—when it can be expressed concisely in terms of mathematics we already have."

Inherent in this discussion is the search for a basic law that would take the form of a unified field theory of all the fundamental forces and all the elementary particles. Yet Gell-Mann scorned using the term "theory of everything." He said such a law would predict possibilities, but it can't predict everything because contingency plays a heavy role.

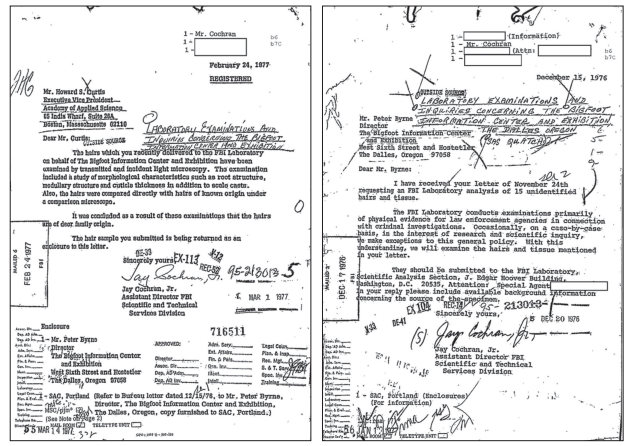
"The basic law cannot be 'a theory of everything' because it doesn't include these zillions of accidents that along with basic law determine the history of the universe. We should never use that term 'theory of everything.'"

"It does not detract from achievements of humans to know that our intelligence and self-awareness have emerged from the laws of physics and biology, plus accidents."

What does he mean by nature being conformable to itself? Gell-Mann began with the old analogy of peeling away an onion to discover more and more layers of reality. As we go to higher and higher energies, he said, "the next onion skin resembles the previous one to some extent. There is a self-similarity." He said Isaac Newton even noticed this effect, in the inverse law effect. —K.F.

Old FBI Documents Reveal Mundane Bigfoot 'Investigation'

Benjamin Radford



In June 2019, breathless headlines referred to an "FBI Bigfoot Investigation," suggesting that newly declassified FBI files shed light on the venerable manlike mystery. As skeptics expected, it was much ado about nothing. In 1976, prominent Bigfoot researcher Peter Byrne, director of the Bigfoot Information Center and Exhibition, wrote to the FBI asking if they would agree to analyze some material—specifically fifteen hairs of unknown origin along with a bit of skin.

The FBI did not "investigate Bigfoot"; it did not deem the monster credible or even worthy of investigation.

This got a December 15, 1976, response from Jay Cochrane Jr., assistant director of the FBI's Scientific and Technical Services Division. He explained that the FBI typically only works on criminal cases but that "Occasionally, on a case-by-case basis, in the interest of research and scientific inquiry, we make exceptions to this general policy. With this understanding, we will examine the hairs and tissue." A follow-up February 24, 1977, letter to Byrne's colleague Howard Curtis provided the results of the examination: "the hairs are of deer family origin." And … that's about it.

The FBI did not "investigate Bigfoot"; it did not deem the monster credible or even worthy of investigation. It just agreed to use its technical expertise to analyze some unknown hairs, which turned out to be from a deer, for a Bigfoot researcher. Bigfoot believers have long been desperate for scientific legitimacy, but this FBI correspondence won't provide it.

Benjamin Radford is the deputy editor of the Skeptical Inquirer.

Credulous Flying Saucer 'Expert' Stanton T. Friedman Dead at Eighty-Four

Joe Nickell

Stanton Terry Friedman (July 29, 1934–May 13, 2019) was one of the world's best known and most controversial flying saucer proponents.

Like some other paranormalists, Friedman would come to parlay a lackluster science career into fringe stardom. Although he constantly referred to himself as a "nuclear physicist," he held no doctorate, having only bachelor and master of science degrees in physics (1955, 1956) followed by just fourteen years of industrial experience. Friedman (1996, 8) described himself in an unguarded moment as a onetime "itinerant nuclear physicist."

Subsequently, Friedman began to devote himself predominantly to UFO research and lecturing. He would boast (Friedman 1996, 13), "I learned early on that the absence of evidence is not the same as evidence for absence." That old saw is true enough; however, one is still left with absence of evidence. Like other credulous paranormalists, Friedman relied heavily on the logical fallacy of what is known as an argument from ignorance—that is, drawing a conclusion from a lack of knowledge. ("We don't know what the UFO was; therefore, it must have been an extraterrestrial craft.")

Again, whereas mainstream scientists begin with the evidence and let it lead to the most likely solution to a mystery, Friedman simply became another partisan who typically began with the desired answer and worked backward to the evidence—employing confirmation bias. This led him to the dubious position that "There are no good arguments to be made against the conclusion that some UFOs are intelligently controlled vehicles from off the earth" (Friedman 2001, 208). He thus seemed not to appreciate the principle of Occam's razor (that the hypothesis with the fewest assumptions is to be preferred).

Friedman bought whole-heartedly into the illogic that belief in UFOs required. He placed quantity of supposed

evidence over quality—whether it was of unidentified aerial phenomena or personal testimony of alien abduction experiences. He came to believe that "entities" might materialize and dematerialize or communicate by mental telepathy.

After New Mexico's Roswell Incident of 1947 was discredited as a downed weather balloon rather than as a crashed alien craft, it was Friedman who later revived the case. In 1978, he looked up retired Major Jesse Marcel, who had been embarrassed by the original "saucer" fiasco. (The debris proved to be from a lost U.S. Project Mogul spy balloon.) Marcel was now quick to claim a cover-up, and Friedman was off and running with a mission. Enlisting others who offered rumors, faulty memories, and worse, Friedman promoted Roswell as a cause celebre wrapped in a conspiracy theory. He frequently used Freedom of Information requests, flouting redacted pages to claim a massive cover-up of extraterrestrial visitations.

Friedman turned his brash style—a mixture of factual distortions and caustic wit—against his skeptical challengers. He referred to them as "nasty, noisy negativists" (once conceding in a Vice video that yes, Joe Nickell was one of those he had in mind). He could be a formidable opponent because he was willing to deliberately misrepresent his adversary's views and then show how absurd the misrepresentations were. (For instance, regarding the Flatwoods Monster case of 1952, he claimed I had proposed "a six-foot tall barn owl and a meteor crash" [Friedman 2004, xiii]. In fact, I showed that eyewitness descriptions were consistent with a barn owl perched on a limb; the meteor, seen over three states, only *seemed* to land—a common illusion caused by its disappearing over a hill [Nickell 2011, 156–166].)

However, his own excessive credulity was a constant problem. He was captivated by the "MJ-12" documents—sensational papers that supposedly proved a Roswellian cover-up but which were amateurish forgeries (Klass 1987–88; Klass 1988; Klass 1990; Nickell 2001; Nickell 2012, 42). His book on MJ-12 is dedicated "To Jesse Marcel, Sr., without whose testimony this quest would never have begun" (Friedman 1996). That is one of the truest and most revealing statements he ever made. Unfortunately, Jesse Marcel was even less trustworthy than Stan Friedman.

References

Feschino, Frank C. Jr. 2004. *The Braxton County Monster*. Charleston, WV: Quarrier Press.

Friedman, Stanton T. 1996. *Top Secret/Magic*. New York: Marlowe & Co.

———. 2001. Stanton T. Friedman Position Statement, in Story 2001, 207–208.

———. 2004. Foreword to Feschino 2004, ix–xiv.

Klass, Philip J. 1987–88. The MJ-12 crashed-saucer documents. Skeptical Inquirer 12(2) (Winter): 137–146.

———. 1988. The MJ-12 papers: Part 2. Skeptical Inquirer 12(3) (Spring): 279–291.

———. 1990. New evidence of MJ-12 hoax. Skeptical Inquirer 14(2) (Winter): 135–140.

Nickell, Joe. 2001. Majestic 12 (MJ-12) documents. Entry in Story 2001, 322–324.

———. 2011. *Tracking the Man-Beasts*. Amherst, NY: Prometheus Books.

———. 2012. *CSI Paranormal*. Amherst, NY: Inquiry Press.

Story, Ronald D. 2001. *The Encyclopedia of Extraterrestrial Encounters*. New York: New American Library.

Joe Nickell, PhD, is CSI's senior research fellow.

LEAVE *a* LEGACY *of* REASON

Imagine a future where science and reason serve as the foundation for our lives.

A future where free expression is guaranteed everywhere around the world.

A future where old sectarian divisions have been overcome by the common bond of secular ideals.

This is the future CFI is working toward. Together, we can achieve it. It's never too early to consider a planned gift—*a legacy of reason*.

Call today to reserve your copy of our new gift-planning brochure—a helpful guide through the many options available to you.

Then speak to your trusted financial advisor or attorney. It's as simple as that.

IT'S EASY

Call **Martina Fern** today at **1-800-818-7071 x426** for your copy of this valuable information, or email her at **mfern@centerforinquiry.org.** There's no obligation.

Joe Nickell, PhD, is CSI's senior research fellow. A former magician and detective, he is author or editor of some forty books.

Gloucester Sea-Serpent Mystery: Solved after Two Centuries

A "wonderful sea-snake" was repeatedly seen in the area of Gloucester Bay and Nahant Bay, Massachusetts, in August 1817 and again in 1819. Although attracting "hundreds of curious spectators," plus a large reward for "his snakeship" alive or dead, the great creature escaped any such fate (Drake 1883, 156–159). The visitations have been reported in many respectable publications—including Richard Ellis's *Monsters of the Sea* (1994, 48–55, 362)—and have prompted this assessment: "Whatever this animal may or may not have been, the fact remains that it is one of the most scientifically respected encounters in the annals of cryptozoology, and remains one of the great unsolved mysteries of the sea" (Morphy 2010).

That the sea-serpent went unidentified was not for lack of effort.

Is it possible now, after two centuries, that we might actually solve the enigma? What might such a solution look like—as it begins to come dimly into view? Will it disappoint or fascinate? Or will it simply represent legend, superstition, and eyewitness error, corrected by a detective approach and access to modern research methods?

Sea-Serpent!

The late, great cryptozoologist Bernard Heuvelmans (1968, 149) captures something of the developing excitement over the Gloucester monster's sudden appearance:

> On 6 August 1817 two women saw a sea-monster like a huge serpent come into the harbor of Cape Ann which lies north of Gloucester roads. Little attention was paid to their story, although it was confirmed by several fishermen, but a week later so many people known to be trustworthy claimed to have seen the animal nearby, that the whole country round was much excited. On 10 August a seaman called Amos Story saw it from the shore. It was near Ten Pound Island in the shelter of Gloucester roads. On 12 August, Solomon Allen 3rd, a shipmaster, saw it from a boat, and again during most of the following day, and for a short time on the fourteenth, when it was watched by twenty or thirty people, including the Justice of Peace of Gloucester, the Hon. Lonson Nash. On that day four armed boats were sent in pursuit of the monster, and Matthew Gaffney, a ship's carpenter, fired at it at almost point-blank range, apparently hitting it with a musket ball in the head, but doing it no harm.

Heuvelmans concludes, "There was no doubt about it, the fabulous sea-serpent was there, large as life, in Gloucester harbour."

A broadside that appeared on August 22—titled "A Monstrous Sea Serpent: The largest ever seen in America"—provided important information, illustrating how observations were interpreted in light of the prevailing belief that such marine creatures were serpentine.

It read (Ellis 1994, 49–50):

> There was seen on Monday and Tuesday morning playing around the harbor between Eastern Point and Ten Pound Island, a SNAKE with his head and body about eight feet out of the water, his head is in perfect shape as large as the head of a horse, his body is judged to be about FORTY-FIVE to FIFTY FEET IN LENGTH. It is thought that he will girt about 3 feet round the body, and his sting is about 4 feet in length.
>
> It was first seen by some fishermen, 10 or 12 days ago, but it was then generally believed to be a creature of the imagination. But he has since come within the harbor of Gloucester, and has been seen by hundreds of people. He is described by some persons who approached within 10 or 15 yards of him, to be 60 or 70 feet in length, round, and of the diameter of a barrel. Others state his length variously, from 50 to 100 feet.

What Was It?

That the sea-serpent went unidentified was not for lack of effort. Naturalist Constantin Rafinesque gave it his attention and believed with others that it was "evidently a real sea snake" (Ellis

1994, 54). The New England Linnaean Society even tried to palm off a new scientific designation: *Scoliophis Atlanticus* (Morphy 2010). A Captain Rich threw a harpoon into the monster as it swam under his whaleboat, but the iron pulled out after fifty yards. Among modern investigators, Richard Ellis (1994, 362), upon studying the case at length, asked with some exasperation, "Shall we assume that hundreds of reputable citizens were deluded or victims of mass hysteria?" Still later, a lady writing a novel had a creative idea: maybe the creature was a "poor humpback whale, entangled with a net or rope lined with keg or cork buoys" (Fama 2012).

If we hope to do better, we should begin by questioning the dogma that the creature was a great snake. In fact, as the Boston *Centinel* took pains to note, it did not "wind laterally along, as serpents commonly do, but his motion is undulatory, or consisting of alternating rising and depression." Other sources, including an affidavit by a ship's carpenter, agreed that "his motion was vertical" (Ellis 1994, 50, 51). In other words, the movement was not sideways like that of a reptile but undulating like a cetacean (a marine mammal), and that should be one of our first clues as to the creature's identity.

Furthermore, on the sixteenth, four men at first saw the monster—not as a single serpentine creature but instead as a school of pilot whales. But, likely influenced by the prevailing view, they then came to think these "whales" looked collectively like the humps of a sea monster (Ellis 1994, 50). This is a well-known illusion, as, for instance, multiple otters can be mistaken for a single, long, multi-humped creature (Nickell 2007).

The tendency to "see" a serpentine form, by connecting the dots (or humps), seems powerful. Several eyewitnesses to the Gloucester monster got different counts: e.g., thirteen, fifteen, twenty, and thirty-two humps, thus getting overall length estimates of 100 or 120 feet or more (Ellis 1994, 50–54; Heuvelmans 1968, 165).

But what about another "serpentine" feature mentioned briefly in the Boston broadside of 1817? Recall the statement that the great snake's "sting" (or stinger) was "about 4 feet in length." The term *sting* was once used historically to mean the wound from the *stinger* of a snake, as in "the sting of an asp." (Now snakes are correctly said to bite, not sting.) Indeed, in one witness's words, the serpent "threw his tongue [i.e., his stinger] backwards several times over his head" (qtd. in Soini 2010, 107).

The movement was not sideways like that of a reptile but undulating like a marine mammal, and that should be one of our first clues as to the creature's identity.

This archaic reference is telling, because there is indeed a marine mammal with a long tusk-like member (in fact a canine tooth) that extends from the head to a length of about 4.9 to 10.2 feet during the up-to-fifty-year life of a male. (A small percentage of females of the species also grow a tusk, but it is smaller.) It appears that this was the four-foot "sting" or "stinger" that emanated from the Gloucester sea-serpent's head, mistaken for a tongue, and thus helps in identifying it at last as the narwhal (or narwhale), which uniquely has this feature.

A New Identification

The narwhal is a medium-sized whale—one of two living species in the family *Monodontidae* (the other being the beluga whale). They range in size from about thirteen to eighteen feet. They tend to congregate in groups of five to ten or even twenty or more. Groups may consist of females and young (about six feet long) or also contain juveniles and adult males. At Gloucester, we can suspect that such a group was mistaken once for a school of pilot whales, then for a single great, multi-humped sea serpent, with eventually one male exhibiting a perceived "stinger." (That horny feature extending from the head has earned the narwhal the nickname "unicorn of the ocean," which is all the more apt because it is "amongst the world's rarest whales" ["Animalia" 2019].)

Indeed, I sought more evidence of the reported stinger—aware that, despite its relatively small diameter, which could make it difficult to see, more than one individual must have possessed one. In time I came upon another—mentioned in affidavits collected by the Linnaean Society (Report 1817, 153). One witness had reported seeing an open mouth, while another described, extending from the front of the creature's head, a long pointed "prong or spear" extending two feet or so from its jaws (Report 1817, 153; Soini 2010, 107). Also, yet another witness had seen such a feature, about twelve inches

long (Soini 2010, 91). I take these instances as providing clear, corroborative evidence for the existence of the narwhal's horn-like tusk—observed on different individuals. Because the tusk makes narwhals unique among marine animals, it represents extremely strong evidence that the "creature" was actually a group of narwhals—however confusingly perceived.

Another element corroborating the identification of narwhals is found in the fact that in August 1819, the Gloucester Sea Serpent appearing at Nahant, Massachusetts, "was stationary for four hours near the shore (qtd. in Ellis 1994, 54). This is quite consistent with narwhal behavior. Its name derives from the Old Norse *nár* (*corpse*) that refers both to its greyish, mottled coloration as well as its summertime habit of lying still (called "logging") on the surface of the water—whether in this case as an individual or "pod" ("Narwhal" 2019; "Animalia" 2019).

A particularly distinctive feature was the creature's ability, described by several witnesses, "to dive straight down without twisting its body in the least."

Among other features consistent with a narwhal was the creature's size—an important point because witnesses were seeing only above-water portions and failed to realize whether they had seen one or multiple individuals. Also, the coloration was typically described as "dark" above and "nearly white" on the underbelly (as far as could be seen); old narwhals eventually become almost totally white ("Animalia" 2019).

A particularly distinctive feature was the creature's ability, described by several witnesses, "to dive straight down without twisting its body in the least" (Report 1817, 153). Heuvelmans (1968, 153) observed that this could be explained if the Gloucester monster had fins or flippers on its sides (hidden under the water) as, of course, the narwhal does, having short, rounded flippers. Also, like narwhals, the monster could swim at great speed (Report 1817, 149–155). Narwhals are "unique and amazing swimmers" and often swim belly up, being capable of sudden, fast, deep dives ("Animalia" 2019).

As we have seen, descriptions of the Gloucester serpent varied widely—not surprisingly because some saw one relatively closely, while others viewed "it" from afar. One witness, for example, watched through his spyglass at a quarter of a mile's distance. He, like most others, saw no eyes, mane, breathing holes, fins, or other fine features. Like many others, however, he reported the creature did have its head out of the water—as the narwhal often does. Most who provided testimony insisted the animal seemed quite unaggressive (Heuvelmans 1968, 152–153), again like narwhals.

Assessment

The narwhal scenario I have postulated here would seem to explain why such a perceived sea serpent appeared—but only did so rarely—in Gloucester Bay, leaving a great mystery in its wake. The prevailing conviction that sea serpents were great multi-humped creatures led eyewitnesses to mistake a "pod" of smaller narwhals—which the witnesses were unfamiliar with—for a monstrous serpent.

Gloucester would have been south of narwhals' expected range today, which includes the Atlantic area of the Arctic Ocean. Individuals are often found in the Canadian Arctic Archipelago—the northern part of Hudson Bay, for example. Narwhals do exhibit seasonal migrations, moving closer to coasts in summer months ("Narwhal" 2019). "Narwhals usually do not stray far below the Arctic Circle," but stragglers have been recorded around Newfoundland, Europe, and the eastern Mediterranean (Drury 2019). It would not seem farfetched for a group to have appeared as far south as Gloucester in 1817 and 1819. I think the distinguishing feature of the monster's "sting," "prong," or "spear"—unique to the narwhal—argues that that is just what happened.

Today, like many mammals, narwhals are threatened by human activity. They are among those Arctic marine animals that are most vulnerable to climate change, due to reduced sea ice coverage in their environment. What an irony that two centuries after humans gathered to watch the mysterious Gloucester Sea-Serpent (and yes, attempted to kill it) we have learned its true nature—without perhaps quite yet learning our own. ■

Acknowledgments

I am perpetually grateful to John and Mary Frantz, who long ago generously provided an endowment for my work, which has made many of my investigations possible. I also wish to acknowledge the efforts of CFI Libraries Director Tim Binga, who continues to obtain the often obscure sources on which successful investigations depend.

References

Animalia: Narwhal. 2019. Available online at http://animalia.bio/narwhal; accessed May 6, 2019.

Drake, Samuel Adams. 1883. *New England Legends and Folklore*. Reprinted New York: Chartwell Books, 2017.

Drury, Chad. 2019. Monodon monoceros narwhal. Available online at https://animaldiversity.org/accounts/Monodon_monoceros; accessed May 9, 2019.

Ellis, Richard. 1994. *Monsters of the Sea*. New York: Alfred A. Knopf.

Fama, Elizabeth. 2012. Debunking a Great New England Sea Serpent. Available online at https://www.tor.com/2012/0816/debunking-a-great-new-england-sea-serpent; accessed May 7, 2019.

Heuvelmans, Bernard. 1968. *In the Wake of the Sea-Serpents*. Translated from the French by Richard Garnett. New York: Hill and Wang.

Morphy, Rob. 2010. Gloucester Sea Serpent (Massachusetts, USA). Available online at https://www.cryptopia.us/site/2010/02/gloucester-sea-serpent-massachusetts-usa; accessed April 30, 2019.

Narwhal. 2019. Available online at https://en.wikipedia.org/wiki/Narwhal; accessed May 2, 2019.

Nickell, Joe. 2007. Lake monster lookalikes. *Skeptical Briefs* 17(2) (June): 6–7.

O'Neill, J.P. 2003. *The Great New England Sea Serpent*. New York: Paraview Special Editions.

Report of a Committee of the Linnaean Society of New England. 1817. Portions cited and quoted from affidavits taken from several eyewitnesses by The Hon. Lonson Nash et al., in Heuvelmans 1968, 149–155. (See also O'Neill 2003, 43–44, 51.)

Soini, Wayne. 2010. *Gloucester's Sea Serpent*. Charleston, SC: History Press.

[NOTES ON A STRANGE WORLD MASSIMO POLIDORO

Massimo Polidoro is an investigator of the paranormal, lecturer, and cofounder and head of CICAP, the Italian skeptics group. His website is at www.massimopolidoro.com.

The Trapped Ghost

The old man sitting in a chair put his hands to his chest and grabbed his sweater, his fingers tightening. He spoke in a whisper, his eyes shut. "Yes … I feel that everything has happened here. This is the right place. It was horrible … . There was nothing left to do. But the time has finally come to end this pain. Now we can free the ghost that has been trapped in this house for so many years." The highlight of the spiritual evocation came after half a day spent walking around the house, climbing stairs up to the attic and then down to the basement, and again room by room. It was the late English medium Eddie Burks that RTSI, the Italian television of Switzerland, had called to the town of Breganzona to see if a beautiful nineteenth-century villa, now home of the municipal offices, was haunted by ghosts. There had been rumors and hypotheses about an infestation after employees had noticed strange happenings—lights that went out, mysterious footsteps, and so on. And I had been called to observe Burks's work and give my opinion on the whole thing.

After we had introduced ourselves, Burks asked me to accompany him on his tour of the house, perhaps wanting to show me that he didn't intend to use trickery—something I had not even suspected, given the kind of demonstrations he often gave—and I gladly accepted to have an opportunity to chat with him and get to know him better.

Burks immediately seemed like a nice guy. I knew that Coutts & Co., a high-profile bank that served Queen Elizabeth, had hired him a couple years earlier to free the bank building from a mysterious headless ghostly presence. According to journalistic reports, no one had seen the ghost since his intervention. Despite his fame, however, Burks did not have the appearance of a mystic nor did he claim to fall into a trance, speaking in a falsetto to simulate the voice of some spirit creature.

Medium Eddie Burks was convinced that he could "hear" the presence of any entity in a given place and could get in touch with it.

However, he was convinced that he could "hear" the presence of any entity in a given place and could get in touch with it. Every now and then he stopped in a room, sat down, closed his eyes, and opened his channels to try to "tune in" to the spirit world. After a couple hours of these tours and attempts, he asked if he could rest for a while.

During that half hour, we took the opportunity to try another spiritualistic approach. A local expert on EVP (electronic voice phenomena), the technique through which some claim to be able to electronically record the voices of the dead, would try to contact the alleged spirit of the villa.

It was a woman with a strong passion for Spiritualism. She used an old cassette recorder for her attempts. We sat in a room where Burks had shortly before said that perhaps he had felt a presence. The recorder was placed on a table while the woman and I sat on two small office chairs. The woman started the recorder and then we sat silent for a few minutes.

The late medium Eddie Burks along with the author (at the time beardless and still with his Medusa-like hair).

The techniques used by EVP practitioners in fact vary. There are those who think that during the recording it is necessary to talk, perhaps read a song from a book, and then listen to the tape and find out if among the normal chatter some "extra" words left by the spirits have slipped in. Others listen to these recordings backward, dozens of times, until some sound in that jumble of upside-down words seems to recall some real word. Others still demand total silence; she belonged to this latter group.

Once the recording was completed, the woman rewound the tape and turned up the volume. Being an old re-

corder, what we heard was a very loud rustling sound, where any random noise (cars passing by on the street, birdsongs, children playing in a park not far away, etc.) became a confused and very noisy jumble. However, something louder was heard in that noise.

"It's a voice! Did you hear it?" exclaimed the excited woman.

"I heard *something*," I said, "but I am not sure it was a voice."

She rewound the tape over and over again to hear the sound repeatedly. "Of course it's a voice! Listen. Let's try to understand what he says."

I didn't insist on the fact that to me it didn't seem like a voice at all, and I let the lady continue.

"Here, perhaps he seems to say: 'I am here …' and again, over and over."

The woman was now sure she had discovered a spirit voice, which in her opinion said something like "I am here. Can you hear me?" At that precise moment a squeak caused by the seat springs as I moved in my chair sounded. It was identical to the "voice" on the tape. The lady blanched, perhaps convinced that the spirit was there with us in the room!

I hurried to reassure her: "No, ma'am. Listen here. It's just the chair that squeaks. It is not a voice."

The color suddenly returned to her face, now quite red. She was forced to admit that I was right; that phrase, "I'm here, can you hear me?" was only a product of her imagination. She then got up, put away her tape recorder, and proclaimed herself too tired to continue.

Meanwhile Burks was ready to start over, and we began walking around the house again until, when we reached a room on the first floor we had already passed several times, he said that the spirit was there. So he sat down and looked for contact. "Tell me!" he pleaded. "Tell me what happened in this house!"

The feeling I had was that Burks sincerely believed in what he did and said. As for the authenticity of spirit contact, I had very strong doubts.

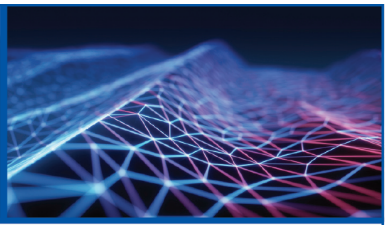
After awhile, he began to tell what the voice told him. In short, a tragedy had occurred fifty years earlier. A young woman, perhaps left by her lover for another woman or perhaps opposed by her father who did not appreciate her suitor, had thrown herself from the stairs; it was not clear whether it was intentionally or by accident, but in any event she broke her neck.

Burks, with tears now running down his cheeks, began to pray and beg that the spirit could be freed and leave those walls. It took about ten minutes of prayer until Burks relaxed, took a deep breath, and finally smiled with satisfaction. "It's done. The spirit is gone," he said, wiping his face.

The feeling I had was that Burks sincerely believed in what he did and said. As for the authenticity of spirit contact, I had very strong doubts. I asked the producers of the TV program to research what had happened in that house some fifty years ago. As I guessed, it turned out that no one had died a violent death in the villa in the past century and surely not a girl with a broken heart who had thrown herself down the stairs.

By the time the discovery was revealed, the medium had already returned to England, and I have strong doubts that anyone ever informed him that—just like the EVP practitioner—perhaps his contact with the afterlife was just a product of his imagination. ■

SCIENCE AND THE PUBLIC



Earn your master's degree in Science and the Public through the University at Buffalo!

Explore the methods and outlook of science as they intersect with public culture and public policy. This degree is ideal for enhancing careers in science education, public policy, and science journalism—and prepares you for positions that involve communicating about science.

This unique two-year graduate degree program is entirely online. Take courses from wherever you are in the world at your own pace! Courses include: Science, Technology, and Human Values; Research Ethics; Critical Thinking; Scientific Writing; Informal Science Education; Science Curricula; and History and Philosophy of Science.

UB Science and the Public
Co-Developed by UB Graduate School of Education and the Center for Inquiry
cfi CENTER FOR INQUIRY

For details visit: https://ed.buffalo.edu/teaching/academics/masters/science-public.html

[REALITY IS THE BEST MEDICINE HARRIET HALL

Harriet Hall, MD, also known as "The SkepDoc," is a retired family physician, a CSI fellow, and an editor of the *Science-Based Medicine* blog. Her website is www.skepdoc.info.

Opioids: The Good, the Bad, and the Ugly

Opium, a dried latex collected from the opium poppy, was the original "wonder drug." It effectively relieved pain and had other medicinal effects—and incidentally produced both euphoria and addiction. There is archaeological evidence that it was used as early as 5700 BC. It was the active ingredient in laudanum and paregoric. For decades, these opiates were readily available without a prescription, and many famous people became addicted, including the poet Elizabeth Barrett Browning and the surgeon William Halsted, a founder of Johns Hopkins Hospital who was considered the "Father of Modern Surgery." Products such as Mrs. Winslow's Soothing Syrup were widely given to infants to get them to stop fussing and to relieve the pain of teething. Parents didn't realize it contained the opium derivative morphine. It worked. It soothed babies, put them to sleep, and relieved frazzled mothers. Unfortunately, there was a risk that it might put babies to sleep permanently.

Morphine was isolated from opium in 1804, and codeine, another component, was identified in 1832. Codeine is metabolized to morphine in the liver. It doesn't work for everyone; it is not effective in individuals who are poor metabolizers. Opium derivatives are called opiates; synthetic analogues are called opioids. Both are classified as narcotics.

Products containing opium derivatives soothed babies, put them to sleep, and relieved frazzled mothers. Unfortunately, there was a risk that it might put babies to sleep permanently.

Chemists have invented well over a hundred semisynthetic and synthetic opioids. They were hoping to find a drug that would be less addictive but only succeeded in creating stronger ones. Heroin was originally marketed as a nonaddictive substitute for morphine. That backfired, and it proved to be highly addictive. It soon became illegal but continues to wreak havoc in the modern world. Fentanyl, first synthesized in 1959, is 100 times more potent than morphine and fifty times more potent than heroin; it has recently become a major cause of overdose deaths.

Opioid Addiction

With continued use of opioids, patients develop *tolerance*: they must increase the dose to get the same effect. That doesn't mean they are addicted. They are physically *dependent* on the drug if they have a physiologic need to keep taking it (i.e., withdrawal symptoms if they stop). That's easily managed by slowly reducing the dose. *Drug abuse* is when the drug is used outside of societal norms. *Addiction* goes a step further—it's a chronic disorder where the drug abuse has a societal impact and there are changes in brain structure and function.

Some people think that anyone who takes an opioid is likely to become addicted; this is not true. Most patients who take an opioid for post-operation or post-trauma pain stop taking it when the pain subsides. The drugs were thought to be powerfully addictive because rats preferred a morphine solution to water and quickly became addicted. But the Canadian psychologist Bruce Alexander suspected the rats' living conditions were more to blame than the drug. The rats were isolated in individual cages, which is not a natural environment for rats. To test his hypothesis, he set up Rat Park,[1] with sixteen to twenty rats of both sexes housed in each cage with food, space, wheels for exercise, and opportunities for play. Lo and behold, the rats in Rat Park preferred water to morphine! Even rats who were already addicted preferred to drink water in Rat Park despite showing signs of dependence and withdrawal. Other studies have confirmed the Rat Park results. In a 2008 study of mice,[2] enriching the environment was shown to effectively reverse drug addiction.

Some people think that anyone who takes an opioid is likely to become addicted; this is not true. Most patients who take an opioid for post-operation or post-trauma pain stop taking it when the pain subsides.

Humans are also powerfully influenced by environment. Twenty percent of soldiers in Vietnam became addicted to heroin, but when they left Vietnam and returned to their normal stateside environment, the addiction resolved practically overnight for 90 percent of the addicts.[3] Contrast that with the experience of typical drug users who relapse when they graduate from rehab and return to their old environment with plentiful cues, triggers, other addicts, and ready availability of drugs.

The Opioid Epidemic and Overdose Deaths

We are in the midst of an opioid epidemic. Nearly two million Americans either abused or were dependent on opioids as of 2014. From 1999 to 2017, 400,000 people died of opioid overdose; at present, 130 Americans die from it every day.[4] The increase in deaths comprised three stages:

1. Starting in 1999: deaths from prescription opioids
2. Starting in 2010: a rapid increase in heroin deaths
3. Starting in 2013: deaths from synthetic opioids, especially illicitly manufactured fentanyl.

There was prescription abuse by the intended patients and also diversion to others, often for profit. Many addicts turned to crime to pay for their habits.

Solutions

For most post-op pain, a three-day supply of pills is usually sufficient, but patients are often given a week's supply or more and end up with unused pills in their medicine cabinet that they may be tempted to share with friends or family or even sell. The most widely proposed remedy for the opioid epidemic is to improve prescribing practices, but this can be counterproductive. Dispensing smaller numbers of pills might prevent some addictions but makes it harder for addicts to get the drugs, so more of them turn to heroin, which is illegal but often more readily available and less expensive. The CDC has published guidelines that, among other things, educate prescribers to restrict opioids for chronic pain patients, providing them only for active cancer treatment, palliative care, and end-of-life care.[5] For some patients, opioids really are the best or the only option, and it is important not to restrict their access in our zeal to prevent opioid deaths. If a dying patient becomes addicted, that's not really a problem.

We could do a much better job of identifying and treating individuals with opioid use disorders. Punishing addicts with jail time doesn't work. Based on the Rat Park studies, we could change our focus from detox and rehab to long-term support of recovered patients focused on improving their environment.

One simple stopgap measure is to supply injectable naloxone (Narcan) to first responders and anyone else who

might encounter someone who has overdosed. It reverses the opioid effect. Where this policy has been implemented, it has already saved lives.

Non-Opioid Substitutes

Several studies have found that opioids are no better than non-opioid analgesics for chronic non-cancer pain.[6] A well-designed 2018 study of children with post-op pain showed no difference between ibuprofen and oral morphine. Non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen may work as well as opioids without the risk of addiction and may have fewer adverse side effects. Opioids can actually *cause* pain through the phenomenon of opioid-induced hyperalgesia. Chronic use can make patients more sensitive to pain. People who have used opioids in the past may have increased pain responses to procedures such as having blood drawn. Opioids are effective for cancer pain, but up to 20 percent of patients will have intolerable side effects requiring a change in treatment.

Big Pharma Malfeasance

Purdue Pharma makes one of the most widely prescribed opioid drugs, OxyContin. A study published in *The American Journal of Public Health* examined the commercial triumph and public health tragedy resulting from Purdue's deceptive and aggressive marketing tactics.[7] Pharmaceutical representatives were instructed to tell doctors that the risk of addiction was less than 1 percent, although this was not supported by any acceptable evidence. Purdue claimed the drug was more effective than other opioids; it wasn't. They claimed the slow-release formulation lasted twelve hours; it actually wore off sooner, encouraging drug abuse. Purdue doubled the number of sales representatives and paid them lucrative incentives (bonuses averaged $71,000 and went as high as $240,000). They collected prescriber profiling data, targeted high-volume prescribers, and encouraged them to prescribe even more. They offered free coupons. They made a deceptive educational video that was not approved by the FDA. They ignored increasing evidence of drug abuse, diversion, and overdose deaths. They ignored marked geographical variations, with some counties filling five to six times as many prescriptions per capita as the national average. The excesses could often be traced to unscrupulous doctors and "pill mills."

The Sackler family, who controls the company, for years systematically ignored warnings and deceived doctors to increase sales. Dr. Richard Sackler was the chief executive. Documents disclosed during legal proceedings showed how he forcefully pushed employees to increase sales of OxyContin and suppressed concerns that might limit those ambitions. He left the Purdue board in July 2018. He denies any wrongdoing and still does not accept that the company had any role in causing the opioid epidemic. He blames the abusers, not the drugs. In a 2001 email, he said, "We have to hammer on the abusers in every way possible … . They are the culprits and the problem. They are reckless criminals."[8]

Opioids are good when used appropriately to relieve pain. They are bad when they lead to addiction, crime, and overdose deaths.

Purdue's business model covered both ends: selling addictive drugs and selling drugs to treat opioid addiction. They promoted the misconception that OxyContin was weaker than morphine. They maintained a list of doctors suspected of abuses but continued to sell to them. The Sackler family's net worth is $13 billion. It is well known for philanthropy, and the Sackler name is on many museums and galleries, including the Metropolitan Museum of Art in New York. Thanks to the OxyContin publicity, these institutions are now refusing Sackler donations.

Lawsuits

Purdue Pharma has been sued many times.[9] In May 2007, they pled guilty to misleading the public and paid $600 million in one of the largest pharmaceutical settlements in history. Three individuals also pled guilty and paid individual fines, and three top executives charged with a felony were sentenced to 400 hours of community service. In the settlement, the company agreed to monitor suspicious patterns of sales but then failed to do so.

In 2015, they settled a lawsuit with Kentucky for $24 million. In 2019, they settled an Oklahoma lawsuit for $270 million. By January 2019, they were being sued by thirty-six states as well as by the city of Everett and others. The House Oversight Committee is investigating. The company is considering filing for bankruptcy.

Purdue appears to be the biggest offender, but several other companies are also being sued. In all, more than a thousand cities, counties, tribes, and states have sued drug makers, distributors, and pharmacies. Hundreds of lawsuits have been consolidated to facilitate prosecution.

Opioids are good when used appropriately to relieve pain. They are bad when they lead to addiction, crime, and overdose deaths. They become ugly when unscrupulous people exacerbate misuse by spreading misinformation and marketing drugs aggressively simply to increase their own profit. ■

Notes

1. https://en.wikipedia.org/wiki/Rat_Park
2. https://www.ncbi.nlm.nih.gov/pubmed/18955698
3. https://jamesclear.com/heroin-habits
4. https://www.cdc.gov/drugoverdose/epidemic/index.html
5. https://www.cdc.gov/drugoverdose/pdf/Guidelines_At-A-Glance-a.pdf
6. https://www.ncbi.nlm.nih.gov/pubmed/30561481
7. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2622774/
8. https://www.statnews.com/2019/02/22/a-secretive-billionaires-role-in-promoting-oxycontin-emerges-in-new-documents/
9. https://en.wikipedia.org/wiki/Purdue_Pharma#Oxycontin-related_lawsuits

[BEHAVIOR & BELIEF STUART VYSE

Stuart Vyse is a psychologist and author of *Believing in Magic: The Psychology of Superstition*, which won the William James Book Award of the American Psychological Association. He is a fellow of the Committee for Skeptical Inquiry.

The New Wave of Exorcism

Exorcism is back. For many of us, our most vivid images of exorcism come from the 1973 movie *The Exorcist*, based on the William Peter Blatty novel of the same name. Who can forget Linda Blair's screaming, spinning head and green projectile vomit? But the latest waves of exorcism are both make-believe and real. In the world of make-believe, there have been many sequels to the original movie, and Fox recently aired two seasons of a series, *The Exorcist*, that provided new chapters to the story. In addition, a new stage play based on Blatty's novel debuted in Los Angeles and London and is scheduled to tour the United Kingdom and Ireland beginning in September.

All these scary stories are very entertaining, but for many people—perhaps for a growing number of them—devils, demons, and embodied evil are not just fantasy. Although it is difficult to get trustworthy data on the number of exorcisms conducted—in part because the Catholic Church discourages media coverage—according to a recent report in *The Daily Beast*, in Italy there are 500,000 requests per year for exorcisms or prayers of the liberation of evil spirits (Nadeau 2019). In addition, Father Vincent Lampert, the official exorcist for the Archdiocese of Indianapolis, told *The Atlantic* that he received 1,700 phone or email requests for exorcisms in 2018 (Mariani 2018). Finally, this spring, for the first time, the Vatican opened its course on exorcism to members of other Christian denominations, including Lutherans, Anglicans, Greek Orthodox, and Pentecostals.

Exorcism has been around as long as people have believed in demons, and people have believed in demons as long as there has been religion. The ancient Mesopotamians are thought to have had a form of demonology, and the Greeks and Romans blamed the work of demons for all manner of disease and misfortune. For a fee, various beggar priests and cunning individuals would cast spells and utter incantations to send evil spirits away. In the Greek and early Roman periods, Jews, whose religious practices seemed strange and foreign, were thought to be especially talented exorcists (Janowitz 2002).

By the fourth century CE, when Christianity became the religion of the Roman Empire, the traditional gods of the Roman pantheon were redefined as demons, and those who persisted in following the "pagan" religion were said to be influenced by demons and, in some cases, possessed by them (Young 2016, 29). Furthermore, although the church engaged in a number of authorized forms of magic, the magic performed outside the church by itinerant practitioners was assumed to involve the assistance of demons. In general, priests believed in the power of the local sorcerers but denounced these magicians because their magic relied on demonic forces.

Logo for the 1973 film (Wikimedia).

In the Middle Ages, the devil or his minions—fallen angels, incubi, and succubi—continued to be implicated whenever bad things happened, and the Christian church became a center of exorcism. The baptism ritual was an explicit form of exorcism, and many consecrated objects, such as holy water, the host, and consecrated salt, were thought to have the power to cast out the devil. In addition, the blessing used to produce holy water was itself an exorcism of the water. For example, an eleventh century English exorcism of water included the following passage:

> I adjure you, creature of water, in the name of Jesus Christ of Nazareth the Son of the living God, our king and our judge, that you may be purged for the sanctification of all things, and that you should not transmit any unclean spirit, but will give honour to the living and reigning Father, Son and Holy Spirit, to the ages of ages. (Young 2016, 84)

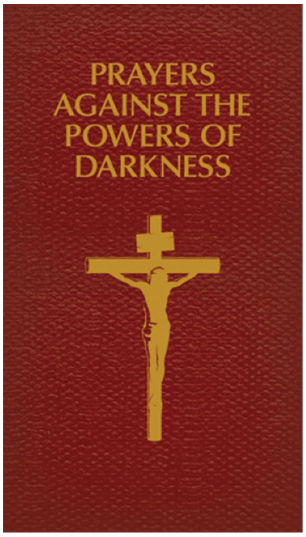
Le bienheureux Guillaume de Tolose (755-812) *tourmenté par les demons* (Blessed William of Toulouse tormented by demons), by French painter Ambroise Frédeau, 1857 (Wikimedia).

Following the Reformation of the sixteenth century, Protestants rejected many of the magical practices of the Catholic Church that highlighted the power of the priesthood rather than a direct relationship with god—including exorcism. However, Protestants did not doubt the existence of demons. For example, witches were thought to consort with demons, and during the great European witch hysteria of 1550–1700, both Protestants and Catholics conducted witch trials and executions (Leeson and Russ 2017).

During the Enlightenment of the eighteenth century, exorcism was challenged by a growing recognition that possession might be more appropriately considered a medical problem, but traditional exorcism never went away. Today, official practice of exorcism is governed by the 1999 Vatican document *De Exorcismis et Supplicationibus Quibusdam* (*Of Exorcisms and Certain Supplications*), which the United States Conference of Catholic Bishops (USCCB) released in an English translation in 2017. The exorcism manual can be obtained only by qualified members of the Church by permission of a bishop, but the USCCB produced a separate small volume that is an English translation of an appendix of *De Exorcismis* called *Prayers Against the Powers of Darkness* (Smith 2017). The USCCB is offering this book for sale online ($6.95) to "assist the Christian faithful in their struggle against the infernal enemy."

According to current doctrine, exorcisms can be conducted only with the approval of the local bishop, and priests who conduct exorcisms must make efforts to distinguish possession from mental illness. The accepted signs of a possible possession include: "a sudden capacity to speak unknown languages; abnormal physical strength; the disclosure of hidden occurrences or events; and a vehement aversion to God, the Virgin Mary, the saints, sacramental rites and religious images, especially the cross" (von Reisswitz n.d.). According to Vatican reports, validated cases of possession are very rare, occurring only once per five thousand reports of possession (von Reisswitz n.d.); however, given the many requests received in recent years, that could amount to quite a few exorcisms.

For their part, the psychiatric community does not endorse the validity of possession by supernatural beings, but it recognizes that mental illness can take the appearance of a possession. The *Diagnostic and Statistical Manual* (DSM) of the American Psychiatric Association (APA) is the accepted catalogue of mental disorders. The fourth edition of the manual (DSM-IV), published in 1994, identified a condition called dissociative trance disorder (DTD), which included "possession trance," in which a person's usual identity was replaced by an identity attributed to a "spirit, power, deity or other person" (During et al. 2011, 237).



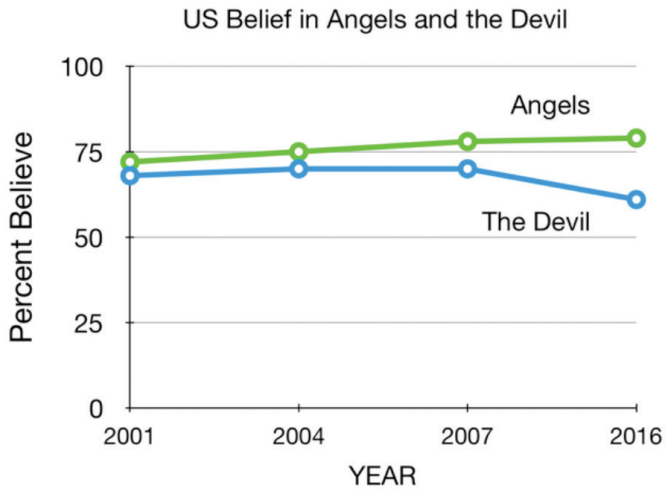
An appendix of *De Exorcismis* offered for sale by the United States Council of Catholic Bishops.

Throughout history and across many cultures, people have entered into trance states, voluntarily or involuntarily. In the eighteenth century, members of the Shaker religion in Europe and the United States exhibited accepted forms of trance states, as did the mediums of the late-nineteenth-century spiritualist movement (Vyse 2018). Today, within several popular denominations of the Christian faith, possession trances come in two forms, one positive and one negative. The more acceptable form of trance happens when believers exhibit glossolalia, or "speaking in tongues," which they believe is a sign of possession by the Holy Spirit. Interestingly, this form of possession, which is sometimes considered a gift (i.e., the gift of tongues), is most often, though not exclusively, found in Protestant Pentecostal or Charismatic groups, whereas the negative form of possession—the kind that requires exorcism—is more strongly associated with the Catholic Church.

In the view of the psychiatric profession, mental disorders must produce some significant level of distress or dysfunction, and, because speaking in tongues is culturally acceptable, only the demonic form of Christian possession is likely to result in a clinical diagnosis. The DSM was most recently revised in 2011 (DSM-5), and in this edition, the APA eliminated DTD in favor of possession-form dissociative identity disorder, a subcategory of dissociative identity disorders. The APA provides this description:

> Possession-form identities in dissociative identity disorder typically manifest as behaviors that appear as if a "spirit," supernatural being, or outside person has taken control, such that the individual begins speaking or acting in a distinctly different manner. For example, an individual's behavior may give the appearance that her identity has been replaced by the "ghost" of a girl who committed suicide in the same community years before, speaking and acting as though she were still alive. Or an individual may be "taken over" by a demon or deity, resulting in profound impairment, and demanding that the individual or a relative be punished for a past act, followed by more subtle periods of identity alteration. (American Psychiatric Association 2013, 293)

According to the most recent Gallup poll, 61 percent of Americans believe in the devil (Newport 2016), which is a slightly lower level than in earlier polls but slightly higher than belief in evolution (57 percent, according to a 2017 Gallup poll, Swift 2017). So why, at a time when belief in the devil is declining, should there be an apparent uptick in exorcisms? There are no good public data on exorcisms, so there is no way to know if the presumed increase is real. But the exorcists interviewed by Mike Mariani of *The Atlantic* reported a growing demand for exorcisms that they

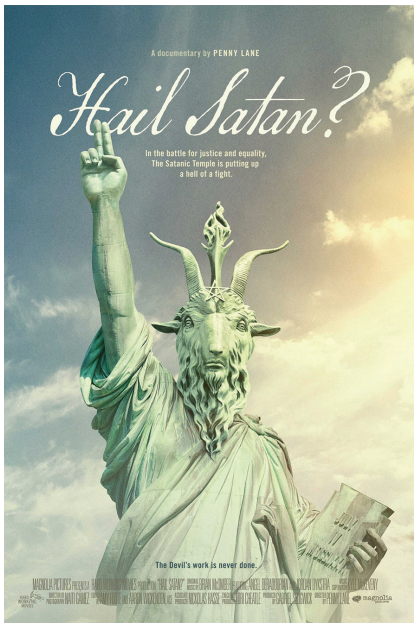


Trends in belief in angels and the devil among U.S. adults (Source: Gallup Polls Newport 2016).

say is caused by an increased interest in the occult. They point to, among other things, the popularity of the Harry Potter books. Although this is a highly unlikely explanation, it is in line with a theory offered by Fox News. Recently Fox News writer Caleb Parke tied the purported increase in demonic possession to The Satanic Temple, which the U.S. Internal Revenue Service recently recognized as a tax-exempt religious organization (Parke 2019a; Parke 2019b). Fox News has devoted considerable coverage to The Satanic Temple's efforts to get various religious monuments removed from public lands, most notably a Ten Commandments monument on the grounds of the Arkansas State Capitol.

The irony of this explanation for an increase in exorcisms is that The Satanic Temple is a science-based organization that expressly does not believe in the actual Satan. According to their tenets, Satan is "symbolic of the Eternal Rebel in opposition to arbitrary authority" (The Satanic Temple n.d.). However, The Satanic Temple is clearly a thorn in the side of traditional Christianity, and the group has grown in size and visibility. Most recently, The Satanic Temple was the subject of a very educational and entertaining feature-length documentary, *Hail Satan?*

A much more likely explanation for any increase in demand for exorcisms is the Catholic Church's own efforts to promote fear of the devil as a method of bolstering its own importance. The recent expansion of the Vatican exorcism


A documentary by PENNY LANE
Hail Satan?
In the battle for justice and equality, The Satanic Temple is putting up a hell of a fight.
The Devil's work is never done.

course to other faiths has given additional legitimacy to the idea that the devil is living among us, but belief in demonology has also been promoted by the pope himself. In an apostolic exhortation released in April 2018, Pope Francis described the devil as "a personal being who attacks us" (Esteves 2018). He stressed the importance of the supernatural and discouraged merely thinking of the devil as "a myth, a representation, a symbol, a figure of speech or an idea" (Esteves 2018). Pope Francis also rejected the possibility that possessions described in the Bible were cases of psychological disorder. The Catholic hierarchy appears to be determined to keep belief in evil supernatural spirits alive, and if they are successful, it is they—and not us—who will benefit.■

References

American Psychiatric Association. 2013. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. Washington (D.C.): American Psychiatric Press.

During, Emmanuel H., F.M. Elahi, O. Taieb, et al. 2011. A critical review of dissociative trance and possession disorders: Etiological, diagnostic, therapeutic, and nosological issues. *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie* 56(4): 235–242.

Esteves, Junno Arocho. 2018. The devil is real and not just a symbol, Pope Francis says in exhortation. *Catholic Herald* (April 9). Available online at https://catholicherald.co.uk/news/2018/04/09/the-devil-is-real-and-not-just-a-symbol-pope-francis-says-in-exhortation/.

Janowitz, Naomi. 2002. *Magic in the Roman World: Pagans, Jews and Christians*. Abingdon, U.K.: Routledge.

Leeson, Peter T., and Jacob W. Russ. 2017. Witch trials. *The Economic Journal* 128(613): 2066–2105.

Mariani, Mike. 2018. American exorcism. *The Atlantic* (November 20). Available online at https://www.theatlantic.com/magazine/archive/2018/12/catholic-exorcisms-on-the-rise/573943/.

Nadeau, Barbie Latza. 2019. Vatican assembles avengers of religion to beat the devil. *The Daily Beast* (May 8). Available online at https://www.thedailybeast.com/vatican-exorcist-convention-tries-innovative-ways-to-beat-the-devil.

Newport, Frank. 2016. Most Americans still believe in God. Gallup.com (June 29). Available online at https://news.gallup.com/poll/193271/americans-believe-god.aspx.

Parke, Caleb. 2019a. Satanic Temple designated as church, given tax-exempt status by IRS: 'Satanism is here to stay.' Fox News (April 25). Available online at https://www.foxnews.com/us/satanic-temple-irs-has-designated-it-a-tax-exempt-church.

———. 2019b. As satanic groups rise, Vatican opens up exorcism summit to non-Catholics. Fox News (May 10). Available online at https://www.foxnews.com/world/satanic-vatican-catholics-exorcism-summit.

Smith, Jennifer. 2017. US bishops publish English translation of exorcism ritual. *Daily Mail Online* (October 25). Available online at https://www.dailymail.co.uk/news/article-5017883/US-bishops-publish-English-translation-exorcism-ritual.html.

Swift, Art. 2017. In U.S., belief in creationist view of humans at new low. Gallup.com (May 22). Available online at https://news.gallup.com/poll/210956/belief-creationist-view-humans-new-low.aspx.

The Satanic Temple. N.d. Learn. Available online at https://thesatanictemple.com/pages/learn.

von Reisswitz, Crista Kramer. N.d. Exorcism rite reformed. CatholicCulture.org. Available online at https://www.catholicculture.org/culture/library/view.cfm?recnum=2824.

Vyse, Stuart. 2018. William James and the psychics. Skeptical Inquirer 42(3): 20–23.

Young, Francis. 2016. *A History of Exorcism in Catholic Christianity*. Basingstoke, U.K: Palgrave.

Matthew C. Nisbet is professor of communication at Northeastern University and editor-in-chief of the journal *Environmental Communication*. He also writes at www.wealthofideas.org.

Science and Society Beliefs across the Globe

A Study of Fifty-Four Countries Assesses Public Optimism and Reservations

From scientific meetings to corporate boardrooms, many societal leaders are deeply concerned about what they perceive as a loss of public faith in technological innovation and the scientific enterprise. Rising tensions over issues such as automation, gene editing, and the transition away from fossil fuels are rooted in broader conflicts related to globalization, modernization, inequality, institutional authority, democratic freedom, and respect for traditional values.

To better understand these dynamics, in a new coauthored research paper published by the American Academy of Arts and Sciences, my coauthor and I analyzed the 2010–2014 World Values Survey, evaluating public beliefs about science, technology, and society across fifty-four countries and 81,000 survey respondents (Nisbet and Nisbet 2019). My coauthor on the paper is Erik Nisbet, a professor of communication at The Ohio State University, an expert on cross-national survey analysis, and my brother.

Our analysis goes beyond describing public opinion trends to dig more deeply into why nations, cultures, and individuals differ in their beliefs about science, technology, and society.

In our study, we assessed country-level and individual-level factors predicting survey measures related to optimism about the ability of science and technology to improve society ("scientific optimism") and those related to reservations about the impact of science and technology on traditional values and the speed of change ("scientific res-

ervations"). These two mental models serve as cognitive shortcuts for quickly evaluating the social implications of specific science and technology–related issues and for estimating the trustworthiness of experts and their institutions as sources of information (Nisbet and Markowitz 2014).

To measure scientific optimism, respondents to the World Values Survey were asked to agree or disagree with statements such as "Science and technology are making our lives healthier, easier, and more comfortable" and "Because of science and technology, there will be more opportunities for the next generation." To assess scientific reservations, respondents were asked to agree or disagree with statements including "We depend too much on science and not enough on faith" and "It is not important for me to know about science in my life."

Each of the fifty-four countries we evaluated in the World Values Survey rated relatively highly on scientific optimism.

To predict survey respondent scores on scientific optimism and scientific reservations, our statistical models allowed us to control for country-level factors such as the degree of economic development, democratic development, scientific development, and the cultural history of a country, while also examining individual-level factors such as those related to socioeconomic status, personal beliefs and values, religiosity, and forms of institutional trust.

Our findings are consistent with those from a recent report conducted by Gallup (2019) and commissioned by the Wellcome Trust UK [see News and Comment in this issue—Ed.], which employed slightly different survey measures to map trends in science attitudes across countries. But our analysis goes beyond describing public opinion trends to dig more deeply into why nations, cultures, and individuals differ in their beliefs about science, technology, and society. We also discuss the relevance of our findings to strategies aimed at addressing rising public anxiety in an era of startling advances and disruptive innovations.

The Post-Industrial Paradox

Each of the fifty-four countries we evaluated in the World Values Survey rated relatively highly on scientific optimism, with the combined mean score for respondents from each country ranging from 6.0 to 8.8 on a ten-point scale. In comparison, scores were relatively lower in terms of scientific reservations. Per country, sample means ranged from 4.0 to 6.5 on a ten-point scale with a higher score meaning greater reservations. On both scientific optimism and reservations, the United States ranked about mid-tier among the fifty-four countries. Importantly, however, the U.S. mean score of 7.2 on optimism was considerably higher than the mean score of 5.0 on reservations.

In our statistical models, after controlling for a variety of factors, people living in less-developed countries were generally more optimistic about science and technology, expressing fewer reservations. People living in economically advanced countries, in contrast, were generally less optimistic and more likely to express stronger reservations.

Our findings can be explained by past theorizing on the "post-industrial paradox": In contrast to less-developed countries, citizens in more-advanced economies may no longer idealize science and technology as necessary to economic growth and human security. Populations living in more advanced economies are still likely to expect benefits from science and technology, but they may also be more sensitized to the moral trade-offs or risks posed by technological breakthroughs and scientific discoveries (Bauer et al. 2012).

Cultural and Historical Context Matter

Seventeen of the nineteen countries that scored highest in terms of scientific optimism were post-Soviet/former Eastern Bloc or Muslim-majority countries, and most of these same countries score at the bottom scale on scientific reservations, a trend that remained significant when controlling for a variety of factors in our statistical models. We interpret these findings as consistent with a long-standing emphasis in former Communist countries on science and technology as a vehicle for progress and the admiration that Muslim publics have expressed when asked in polls about Western science, medicine, and technology.

Interestingly, even when controlling for economic modernization, people living in countries with greater scientific and technological output as measured in terms of scientific publications, patents, and citations tend to be more optimistic about science and technology and to hold fewer reservations. In this case, however, it remains unclear whether a national culture of scientific optimism that expresses fewer social reservations drives scientific ambition and productivity or whether national ambition and productivity boosts public optimism and limits the expression of reservations.

People living in less-developed countries were generally more optimistic about science and technology, expressing fewer reservations.

Religious Faith and Freedom of Expression

Turning to individual-level factors, religious individuals living in more-advanced countries with greater political freedom were more willing to express their reservations about science and technology than their similarly devout counterparts living in countries that lack such freedoms. Several related processes may account for these findings. First, as people living in more-advanced countries achieve greater personal and societal security, they appear

to be no longer willing to overlook the potential risks, economic costs, or moral trade-offs associated with scientific advances and innovations. To the extent that individuals living in more-advanced countries also enjoy greater political freedom, they can also express these reservations about emerging issues, such as gene editing, without fear of political sanction.

In contrast, those living in less-developed countries may not only view science and technology in terms of social progress and enhanced security but also as a source of national pride and global competitiveness. To the extent that they live in a country with fewer political freedoms, even if they did hold reservations, they may not be willing to express them for fear of reprisal.

Liberal Values, Inequality, and Authority

Across countries, those individuals who share classical liberal values oriented toward free enterprise, free inquiry, and the pursuit of knowledge, networks, and information, and who have thrived in a globalized market economy also tended to be among the most optimistic about science and technology and to express fewer reservations. There were, however, important caveats and contingencies to these relationships based on the country-context in which an individual lived.

Specifically, the least educated residing in the richest countries tended to express much higher levels of scientific reservations than the least educated living in poorer countries. For wealthier optimists, scientific advances and innovations are likely to enhance their careers, fuel gains in their stock portfolios, and provide benefits that they can afford. But many other members of the public are justifiably concerned that advances such as automation or gene editing may displace their jobs, remain beyond their ability to afford, and/or conflict with cherished values.

In wealthier countries, such as the United States and those of Western Europe, individuals expressing greater skepticism of traditional forms of authority, such as the family, nation, and state, were less optimistic and held stronger reservations about science and technology than their counterparts in poorer countries. In advanced economies, those skeptical of traditional forms of authority may be more prone to view the close association between scientific research, technological innovation, militarization, and surveillance as operating in the service of elite control rather than economic growth and progress, as their counterparts in developing countries might still primarily view science.

It remains unclear whether a national culture of scientific optimism drives scientific ambition and productivity or whether national ambition and productivity boosts public optimism.

Conclusion

On the topic of morally fraught issues that challenge traditional values, major investments in public dialogue across advanced economies are needed. But to lead a national and global conversation about such powerful scientific advances, scientists will need help not only from their colleagues in the humanities, social sciences, and creative arts but also from journalists and philanthropists.

Informed public discussion about scientific advances and innovations is not possible without high-quality, sustained reporting from journalists with deep knowledge of the subject. New initiatives to understand public attitudes, improve public dialogue, and report on the complexities of these emerging technologies will not be possible without financial support from government and philanthropists.

There is no clear "communication fix" for the deep-seated reservations that many individuals have about science and technology. Apart from traditional values, these reservations are also rooted in widening levels of inequality and the role that innovation plays as a main driver of such disparities. Publicly financed scientific research has generated vast wealth for professionals at the top of the knowledge economy, just as those same innovations have eliminated millions of jobs among people at the bottom, transforming entire industries and regions.

Scientists and engineers, therefore, have both a strategic and an ethical imperative to help society cope with the negative effects of globalization and automation, forces that their advances and innovations have helped set in motion. We need broader strategic thinking about the handful of policy goals and investments that scientists and engineers can join with others in pursuing that would help alleviate inequality and the threats posed to the scientific enterprise if such policies are not pursued.

The ability of scientific expertise to be leveraged on behalf of public solutions to problems such as climate change is limited by waning public trust in government and almost every other major institution, including the news media, business, the legal system, universities, elites generally, and even capitalism itself. As with economic inequality, there is no communication fix for this widespread erosion in trust. Rather, the scientific community must join with the leaders of other sectors of society to pursue strategies for restoring the health of our civic culture.■

References

Bauer, M.W., E. Shukla, and N. Allum (eds.). 2012. *The Culture of Science: How the Public Relates to Science across the Globe*. London: Routledge.

Gallup. 2019. *Wellcome Global Monitor—First Wave Findings*. London: Wellcome Trust UK. Available online at https://wellcome.ac.uk/reports/wellcome-global.

Nisbet, M., and E.M. Markowitz. 2014. Understanding public opinion in debates over biomedical research: Looking beyond political partisanship to focus on beliefs about science and society. *PloS One* 9(2): e88473.

Nisbet, Matthew C., and Eric C. Nisbet. 2019. *The Public Face of Science across the World: Optimism and Innovation in an Era of Reservations and Inequality*. Cambridge, MA: American Academy of Arts and Sciences. Available online at https://www.amacad.org/project/public-face-science.

[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or coauthor of a dozen books, including *Investigating Ghosts: The Scientific Search for Spirits*.

Subliminal Advertising, Trumpian and Otherwise

Q: **Until this morning, I'd thought subliminal messages were prohibited by international and federal law. I'm sending this to all my friends in the United States and abroad. This is not a political issue; it's a human rights issue. We're all in danger. Please contact your representatives and tell them to enact legislation that prohibits subliminal messages. The Facebook and opioid scandals are nothing compared to this! When I Googled "subliminal messages in advertising," I was shocked—it's bragged about. Thank you and please pass on this warning.**

—S. Owings

A: I received the above email (with many others cc'd) in late 2018. Around the same time, I was informed by an acquaintance that she, too, was concerned about this threat. Not only had she heard of Donald Trump using subliminal ads to manipulate the public, but she claimed to have personally seen one. Several months earlier while casually watching television, she saw the single word *Trump* flash, quickly but noticeably, on her television screen. She said she called her cable company to complain, and she understood the representative to have admitted knowing about the subliminal ads and to have offered to have them turned off upon her request.

I was unable to verify any of this information, though I diplomatically noted two things: first, the fact that she noticed and recognized the word *Trump* meant that it was not in fact *subliminal*, since it was (apparently) clearly seen, read, and processed; and second, that merely seeing the single word *Trump* would not necessarily be a persuasive or positive "message" from an advertising or mass communications point of view. Trump's name appears countless times each day in print, online, and elsewhere—sometimes positively, but more often negatively.[1]

To address this question, let's look at the truths and myths surrounding subliminal advertising. Fear of the influence of advertising dates back over half a century and is tied specifically to fears about modern mass media. As psychologists Sergio Della Sala and Barry Beyerstein noted, the first fears about subliminal ads came from

> a well-publicized case reported in 1957 by James Vicary, an advertising consultant, popularized the notion that visual or auditory messages, played while we are aware—but too weakly or rapidly to be consciously perceived—could still affect consumer or voter preferences and produce therapeutic changes in people's behavior. The technique is called "subliminal messaging." Vicary claimed that by flashing the message "eat popcorn" or "drink Coke" on a cinema screen, too briefly for it to be noticed by the theater patrons, he had dramatically increased subsequent sales at the snack bar. (Della Sala and Beyerstein 2007, xxiii)

To address this question, let's look at the truths and myths surrounding subliminal advertising.

Vicary claimed that for six weeks during the summer of 1957 he showed subliminal ads to more than 45,000 people in a Fort Lee, New Jersey, theater. Popcorn sales at the concession stand popped an additional 57 percent after people subliminally saw the words "eat popcorn," and soda sales increased about 18 percent. Vicary made the announcement in a September 12, 1957, press release. Vicary, notably, offered no proof whatsoever of his dubious achievement, but it didn't matter. The public was alarmed by this sneaky Svengali act, and Congress opened up inqui-

ries into this powerful—and possibly illegal—technique. Five years later, in 1962, Vicary admitted in an interview for *Advertising Age* magazine that his experiment had been bogus; it was all part of a marketing stunt, a gimmick to gain him national notoriety and clients. Indeed, "Vicary had in fact collected little or no evidence of this kind, and later attempts to replicate his alleged effect failed conclusively" (Della Sala and Beyerstein 2007, xxiii).

Vicary's subliminal hoax was widely promoted, including in the book *The Hidden Persuaders* by anti-consumerist critic Vance Packard, cementing the fear that seemingly ordinary images contained hidden messages. Two decades later Wilson Bryan Key, in his influential and best-selling 1973 book *Subliminal Seduction*, picked up the alarmist theme and claimed that advertisers secretly embedded images of sex and death in their ads to manipulate people into buying their products.

Our own Martin Gardner noted:

> This tendency of chaotic shapes to form patterns vaguely resembling familiar things is responsible for one of the most absurd books ever written about advertising: *Subliminal Seduction*, by journalist Wilson Bryan Key. The Signet paperback had on its cover a photograph of an ice-filled cocktail with the caption "Are you sexually aroused by this picture?" It was the author's contention that hundreds of advertising photographs are carefully retouched to "embed" concealed pictures designed to shock your unconscious and thereby help you remember the product. The hidden pictures include words ranging from sex to the most taboo of four-letter words, but there are also phallic symbols and all sorts of other eroticisms. In the ice-cube in an ad for Sprite, the author professed to see a nude woman cohabiting with a shaggy dog. It's hard to imagine anyone taking this nonsense seriously, especially since the author's many references to "recent studies" never disclosed where they took place or who the experimenter was. (Gardner 1985)

In the 1980s, concern over subliminal messages spread to bands such as Styx and Judas Priest, with the latter band even being sued in 1990 for allegedly causing a teen's suicide with subliminal messages (the case was dismissed).

To be clear, from a psychological point of view subliminal *mental processing* does exist and can be tested. But just because a person *perceives* something (an advertisement or the word *Trump*, for example) subconsciously means very little by itself. There is no inherent benefit of subliminal advertising over regular advertising, any more than there would be in seeing a flashed glimpse of a Coke commercial instead of the full twenty seconds. Getting a person to *see* something for a split-second is easy; filmmakers do it all the time. Getting a person to *buy or do or support something* based on that split-second is another matter entirely. (The conspiracy was parodied in the 1980s television show *Max Headroom*, in which viewers were exploding after seeing subliminal messages called "blipverts.") Veteran ad man Bob Garfield summed up the matter in a column for *Advertising Age*: "Subliminal advertising does not exist except in the public's consciousness, at least not in consumer advertising. Nobody bothers with it because it's hard enough to impress people by hitting them upside the head" with clear, loud, and blatant messages and images (quoted in Della Sala and Beyerstein 2007).

Subliminal advertising was based on a marketing hoax, but fear sows conspiracy and distrust. Using Google to search for information on "subliminal advertising" does not, of course, constitute research into its validity; confirmation bias will guide those predisposed to conspiracy and alarmism to all they need to confirm its truth. And the last thing lawmakers need are an alarmed public demanding they enact laws over phantom fears; there are enough real problems in the world. Trump can be credibly accused of many things, but persuading people to like him through subliminal advertising is not among them. ■

There is no inherent benefit of subliminal advertising over regular advertising.

Note

1. If merely seeing or reading the word *Trump* caused people to admire or support him, it would have had an effect years ago. Seeing the name of a person with little name recognition repeated (subliminally or otherwise) during a campaign might help that person in polls—compared to another political rival no one's heard of—but in 2019 after decades of branding everything from steaks to resorts to scandal-shuttered universities, Trump's name is well known.

References

Della Sala, Sergio, and Barry Beyerstein. 2007. Introduction: The myth of 10% and other tall tales about the mind and brain. In Sergio Della Sala (ed.), *Tall Tales about the Mind and Brain*, New York: Oxford University Press.

Gardner, Martin. 1985. The great stone face and other nonmysteries. Skeptical Inquirer 10(1)(Fall).

The Remedies of National Geographic

The National Geographic Society has published a series of books about "natural healing remedies." They are full of claims that lack scientific evidence, are inconsistent and internally contradictory, and don't reach even minimal scientific standards. The NGS should reconsider them.

VICTOR BENSON

"For more than 130 years, the National Geographic Society has been at the forefront of combining science, exploration, and storytelling to better understand the world around us," a fundraising letter begins. "National Geographic Society is determined to be the organization people around the world can turn to for information they can trust." Its long and storied history well known, few people would doubt the Society's sincerity when it describes its "passion for science."

It was surprising, therefore, to learn that the National Geographic Society (NGS) has in the past decade published at least six books that, according to their covers, promote natural healing remedies, home remedies, and medicinal herbs, all of which "treat common ailments." Do these publications align with the well-deserved, science-based reputation of the NGS?

This article reviews those six books, all readily available on the internet (see sidebar for full titles). The focus here is on the publications themselves as a whole; I make no attempt to engage in the debate regarding the value of "alternative medicine," although references to it cannot be completely avoided.

First, the Good News

The books are well written, beautifully illustrated, and, when indicated, often provide appropriate cautions regarding their recommendations. They offer suggestions about many subjects that may be helpful to readers, including information regarding nutrition, lifestyle, personal care (deodorants, etc.), and household tips (floor cleaners, etc.). But the focus of the books, and this article, is medicinal herbs. The thorough discussions about the botany, preparation, usefulness, and precautions of using herbal substances can serve as a powerful resource.

Plants have been a source of medicinal products for centuries. Many of today's important pharmaceuticals are derived directly from plants. The *Guide to Medicinal Herbs* categorizes and characterizes seventy-two plants that have been used therapeutically. The books are forthright in advising the reader that there are important caveats. *Complete Guide to Natural Home Remedies*, for example, notes that some remedies are supported by evidence that is largely anecdotal, that they may have side effects, and that they can interfere with prescription medications. In a statement found frequently throughout the books, the reader is advised, "If you're not sure that a natural remedy might be safe for you, consult your health care provider." These warnings are appropriate.

In many respects, the books are praiseworthy. But that is not the end of the story.

The Not-Good News

Although warnings are present, they are not helpful, as the books proceed to advise taking substances that have little or no evidence of safety or effectiveness and ignore that there is essentially no way for a person to know in advance whether a "natural remedy would be safe" for them. Furthermore, the reader cannot be certain whether the advice is good, unsupported, inaccurate, false, or harmful; it's all mixed together.

Problems occur when the authors overreach and promote ideas that are not supported by evidence and when the books are inconsistent with each other. The important question I seek to answer is: Do these books provide reliable advice about curing or preventing illness? Or, in the vocabulary used by the books, do these "remedies" for "ailments" actually work?

Cause for Concern

Skepticism begins with the book covers. Five of the six covers do not identify an author—which is unusual for such books—and have the word *remedies* in the title. A *remedy* is something that cures or relieves a disease or bodily disorder. When used as a verb, it means "to cure or heal, as by medicinal treatment." Judging by the covers (which, in this case, you *can*), it appears that the NGS books are offering cures for disease.

Two of the publications' introductions state that "we have sought the best ideas from around the world and put them to the test of current science." Another states, "This book showcases the … herbs, plants, and essential oils that can help you treat diseases and ailments." From statements such as these and other promises of "remedies," it is clear that the publications are claiming to offer scientifically based advice about treating and preventing disease.

PROBLEMS OCCUR WHEN THE AUTHORS OVERREACH AND PROMOTE IDEAS THAT ARE NOT SUPPORTED BY EVIDENCE AND WHEN THE BOOKS ARE INCONSISTENT WITH EACH OTHER.

The small-print "Note to Readers" at the beginning of each book, however, in disclaiming "any liability whatsoever," states that "the author and publisher are not rendering medical or other professional advice." The note warns to "consult a health care professional to address any health concerns specific to you." These advisories contradict the obvious message of the books. The statements "Treat illness nature's way" and "how to employ natural remedies to cure or control common physical ailments" are more examples that belie the "Note to Readers" claim. The argument that explaining how to treat medical conditions does not constitute medical advice is specious and disingenuous.

The self-contradictions are concerning. Medical textbooks do not have disclaimers advising the reader that they are not rendering medical advice. Medications are tested and proved effective and safe by reproducible evidence. Rather than warn the reader that its claims are not medical advice, if the NGS is to remain true to its stated commitment to science, it shouldn't recommend remedies that lack a sufficient evidence base to support the claims.

The warning, by itself, throws into doubt the veracity, and thus the value, of the remedies. Given that the NGS books therefore clearly reside in the arena of "alternative medicine," perhaps their "remedies" should be called "alternative remedies." (Some say that, like "alternative facts," there is no such thing as "alternative medicine"—if the remedy had sufficient evidence of effectiveness and safety, it would simply be called "medicine.")

The books reviewed:

- ***Guide to Medicinal Herbs*** (2010)—384-page book.
- ***Complete Guide to Natural Home Remedies*** (2012)—384-page book.
- ***Nature's Best Remedies*** (2019)—318-page book.

"Bookazines" softcover, 8½ x 11 inch, yellow-bordered publications:

- ***Healing Remedies*** (2014)—112 pages
- ***Nature's Best Remedies*** (2015, reissued 2018)—128 pages
- ***Natural Home Remedies*** (2017, reissued 2019)—112 pages

Description of Problems

The problems with the NGS remedies enterprise can be classified into six features, any one of which would disqualify a publication from legitimately claiming that its advice about how to treat illness has been put to the "test of current science."

Lack of actual evidence. Though it is understood that these books are intended for a lay audience, it would increase confidence in their messages if at least a few references to supporting data were provided. Phrases frequently found throughout the books include "some studies point to," "research has shown that," "animal studies show," "researchers are looking at," and the like. It would be valuable, and increase the believability of the books, if actual references to specific studies would at least occasionally be cited to back up the claims being made. In the over 1,400 pages that compose the six books, there are no references to the scientific literature.

JUDGING BY THE COVERS (WHICH, IN THIS CASE, YOU CAN), IT APPEARS THAT THE NGS BOOKS ARE OFFERING CURES FOR DISEASE.

Overreach stretching credulity. After proclaiming that "Research verifies that these vegetables offer a range of nutrients," the next sentence states, "They also provide antibiotic, antibacterial, antiviral, antioxidant, and anticancer properties, making them useful as remedies for skin infections, restoring vigor, curing sleeplessness, easing migraines, and even combating cancer." Next, we're told that adding these to our diet "could provide the following health benefits," including lowering high blood pressure, normalizing an irregular heartbeat, slowing down the progression of Alzheimer's disease, reducing bone loss in postmenopausal women, and decreasing indigestion and nausea.

Beyond this probably harmless fantastical litany, however, there is a statement that raises a serious concern: that these plants "act as detoxifying agents, especially for those suffering from jaundice." Anyone who has jaundice needs to see a physician immediately to find out why. Delay literally could be fatal.

Not a shred of evidence is presented to support even one of these many claims. If half of them were true, the great value to humankind would likely be widely known. What is this magic substance? It's water chestnut.

Is there evidence? A search of the medical literature turned up one 2014 study that found extracts of water chestnut lowered sugar in mice. Ironically, lowering high sugar is not a benefit the NGS book claims. No studies of the health effects of water chestnuts in humans could be found. The claim for lowering blood pressure apparently comes from the fact that water chestnuts contain potassium (as do many foods), not that a study showed eating water chestnuts lowers blood pressure. One health-related study found that "microcystins can accumulate in water chestnuts, which is a potential hazard for human health." (Microcystins are a toxin produced by fresh water algae.)

Internally contradictory. "Because of its potent anti-inflammatory properties, cat's claw is used to treat joint problems such as those occurring in osteoarthritis and rheumatoid arthritis." Two pages later, rheumatoid arthritis is listed as one of three "Therapeutic Uses" for cat's claw. Remarkably, immediately adjacent, in the next column on that page, there is a boxed warning stating, "Those with autoimmune diseases … should not use cat's claw." Rheumatoid arthritis *is* an autoimmune disease and, if not properly treated, can damage joints. Delay in receiving evidence-based treatment can harm people who have rheumatoid arthritis.

Bad advice. In a section on dairy, claims are made that full-fat cheese and butter are not only okay to eat but may offer health benefits. The rationale is due to a misunderstanding of cholesterol metabolism. Contrary to the book's statements and inferences, saturated fat (which cheese and butter are full of) *increases* the concentration of low-density lipoprotein cholesterol (LDL-C—the "bad" kind), which is associated with increased risk of heart disease and death.

Failure to inform about alternatives. One of the books advises that you can treat athlete's foot with lavender essential oil because of the oil's antifungal action. Two methods of preparation are described. Mix three drops of lavender oil with one teaspoon of sweet almond or grapeseed oil, or combine two teaspoons of tincture of benzoin with five drops of lavender oil and five drops of thyme oil. What is not mentioned is that clotrimazole, for example, one of several inexpensive, generic, over-the-counter creams, has

been proven to quickly and completely eliminate the athlete's foot fungus. Its safety and efficacy has been tested, its purity is assured by a regulated production process, and it is more convenient, as all that is required is squeezing cream out of the tube. No mixing of drops required.

This benign example causes one to question what service NGS is providing by describing an inferior method of eliminating foot fungus (if it works at all) and not mentioning an established, tested, proven safe and effective, easier-to-use treatment. A thirty-gram tube of clotrimazole can be purchased online for $3.19. The lavender oil alone costs more than twice as much.

Inconsistency among the books. The NGS books recommend a variety of substances to treat high blood pressure (hypertension), which are listed here by book.

- *Nature's Best Remedies* (2019): Fennel, water chestnut, saffron, hibiscus tea, juicing or smoothies with ingredients apple, beet, celery, cucumber, ginger.
- *Guide to Medicinal Herbs* (2010): Grape seed extract, parsley, stevia, hibiscus, and chocolate.
- *Complete Guide to Natural Home Remedies* (2012): Beet juice is mentioned in the foreword, but hypertension is not addressed elsewhere in the 384-page book.
- *Nature's Best Remedies* (2015, reissued 2018): Grape seed extract; warnings against using parsley and hibiscus if taking high blood pressure medication.
- *Healing Remedies* (2014): The "Common Ailments" chapter has no section on cardiovascular conditions at all, and it has no index.
- *Natural Home Remedies* (2017, reissued 2019): Also offers nothing about high blood pressure, even in its "remedies for common ailments" chapter. It does mention parsley, but only to recommend it for bad breath.

Analysis:

- No single remedy is recommended in all four books that mention any treatment for hypertension.
- One of the books recommends parsley or hibiscus and another also recommends hibiscus, but a third warns *against* parsley and hibiscus if taking hypertension medication. The two recommending parsley and hibiscus do not mention the warning.
- Two of the books offer nothing for hypertension.

These inconsistencies, contradictions, and omissions would never occur in medical textbooks because there is overwhelming evidence that many medications successfully treat hypertension. It is telling that there was no single herbal remedy for hypertension that all four books recommended. *All* truly scientific, evidence-based texts discussing hypertension would agree that hydrochlorothiazide, for example, lowers blood pressure. Over 116 million people, 46 percent of U.S. adults, have hypertension. It is a major contributor to cardiovascular disease, which is the leading cause of death in the United States for both men and women. Not mentioning it in books purporting to offer advice about common ailments is bewildering and irresponsible. Where is the science and reason for trust that the NGS claims?

GIVEN THAT THE NGS BOOKS CLEARLY RESIDE IN THE ARENA OF "ALTERNATIVE MEDICINE," PERHAPS THEIR "REMEDIES" SHOULD BE CALLED "ALTERNATIVE REMEDIES."

Butterbur (*Petasites hybridus*)

It is interesting and instructive to examine in depth the NGS books' treatment of any one herb. Selecting the first plant described in the *National Geographic Guide to Medicinal Herbs* introduces us to butterbur. It turns out this plant is an excellent example, because it demonstrates the many pros and cons of "natural" and "herbal" medicine.

Conditions claimed to be improved by butterbur. As is true for many of the herbs discussed in these books, multiple therapeutic uses are attributed to butterbur. The list, compiled from the six books, includes: prevention of episodic migraine headaches; treatment of seasonal allergies; relief of joint pain; decrease of cough, bronchitis, and asthma; ease of irritations of the small intestine; treatment of gastric ulcers; and reduction of urinary tract spasms.

Unlike many of the herbs discussed in these books, butterbur has some evidence of effectiveness. A few small studies show a decrease in the frequency of migraine headaches in people taking butterbur compared to placebo. Evidence also exists, though some of it has been questioned, that butterbur is effective in treating intermittent allergic rhinitis. But there is also evidence that it is not. Studies showing benefits of butterbur for asthma exist, but most of them have been done in animals.

RHEUMATOID ARTHRITIS IS LISTED AS ONE OF THREE "THERAPEUTIC USES" FOR CAT'S CLAW. BUT THEN THERE IS A BOXED WARNING STATING, "THOSE WITH AUTOIMMUNE DISEASES ... SHOULD NOT USE CAT'S CLAW." RHEUMATOID ARTHRITIS *IS* AN AUTOIMMUNE DISEASE.

What about the other conditions? Several of the books state that butterbur helps treat "gastric ulcers and small intestinal irritation." A search for the science behind those statements is revealing. In a 2001 monograph in *Alternative Medicine Review* (a journal that existed for sixteen years and ceased publication in 2012), it was stated that "ethanolic extracts of *Petasites hybridus* blocked ethanol-induced gastric damage and reduced ulcerations of the small intestine caused by indomethacin." That statement was copied almost verbatim from the 1993 study that reported, "Alcoholic extracts of *Petasites hybridus* block the ethanol-induced gastric damage and reduce small intestinal ulcerations induced *in rats* by indomethacin" (emphasis added).

This story illustrates how misinformation can be generated, amplified, and embedded in the literature. The *Alternative Medicine Review* monograph omitted the important information that the one (and apparently only) butterbur gastrointestinal study was done in rats. Not only is there apparently no evidence that butterbur is beneficial in treating human gastric and small intestinal problems, there is no apparent evidence that this use has ever even been studied in humans or that anyone even ingests butterbur for these indications. Yet because several of the NGS books mention it, the reader could come away thinking that butterbur might be a good option to treat their gastric ulcer and/or small intestinal irritation.

Making a bad situation worse, there are no specific symptoms that can identify the source of abdominal pain or nausea as originating in the small intestine. How is the lay reader, for whom these books are intended, going to be able to make that judgment? The person who takes butterbur for abdominal pain, mistakenly thinking it is from their small intestine, could be delaying treatment of a serious condition, while consuming an herb that has no human evidence to support its use in any gastrointestinal disease.

A search of the U.S. Library of Medicine through Pub Med turned up no studies on the use of butterbur for joint pain, cough, or urinary tract spasms.

Butterbur or not Butterbur. The most recently published *Nature's Best Remedies* contains an excellent, extensive index, listing everything from *abelmoschus esculentus* to zucchini, but butterbur is not there. Butter, however, is—see previous *bad advice*.

The index directs the reader to four areas in the book where headache remedies are mentioned. Taken together, the list of remedies is long: cayenne pepper; magnesium; eliminating gluten; mint; inhaling lavender essential oil for fifteen minutes or rubbing it into the forehead, temples, and neck; aromatherapy with a blend of eucalyptus, peppermint, sandalwood, and rosemary; juicing with a combination of apple, cucumber, ginger, celery, and kale; and increasing intake of beans, whole grains, seeds, nuts, leafy greens, and dairy products. One wonders about the advice to increase dairy products, though, because on the same page in the well-written, accurate and helpful section informing about the etiology and pathology of headaches, we are advised that aged cheese is a migraine trigger.

In the one therapeutic area where there is some evidence that butterbur might provide benefit, butterbur is absent. Where is butterbur? This is a consequential question. This encyclopedic 318-page volume, published in 2019, has a long list of headache remedies but does not mention butterbur in any of the four sections that deal with headache. This omission makes one doubt both the benefit of butterbur and the value of the books.

The credibility of the NGS publications gets even worse when you look at two of the other books. *Complete Guide to Natural Home Remedies* mentions butterbur only as an alternative to fennel for cough. Throughout the book, there are ten other suggestions for headaches. The "bookazine" *Natural Home Remedies* describes six remedies for headaches, but butterbur is not among them.

So, half the books do not mention butterbur as being helpful for headache. That is stunning. No reputable medical book would leave out a proven, effective treatment for the condition under discussion. Given that butterbur is one of a small group of herbs that actually has some acceptable evidence of effectiveness, it seems inexplicable that it is not uniformly recommended for episodic migraine prevention in all the publications.

As in the hypertension example previously, the inconsistency among the books reflects a lack of scientific rigor and leaves the reader not knowing what to believe, if anything.

Safety and Availability. Severe liver damage may occur from butterbur use. This is thought to be due to the presence of pyrrolizidine alkaloids (PA), which are in the plant itself and are hepatotoxic. A study from the World Health Organization's database reported forty cases of hepatotoxicity, including two liver transplants associated with the use of *Petasites* formulations. One source states that the PA are also carcinogenic and cause lung toxicity and thrombosis. Liver function blood test monitoring is recommended by some authorities for people taking butterbur.

Minor side effects associated with butterbur have been reported to include belching, headache, diarrhea, fatigue, drowsiness, breathing difficulties, and allergic reactions. None of these is mentioned in any of the books. There is no known antidote for butterbur overdose.

To the NGS books' credit, where butterbur is discussed, the reader is advised to only use products that are free of PA. But ensuring that may be difficult. A recent study analyzed twenty-one butterbur products sold in the United States for petasins (the active ingredient in butterbur) and PA. Seven products contained petasins and no PA. But seven products had toxic PA levels and six had no petasin. From this sample, it could be inferred that the purchaser buying butterbur has only a one in three chance that the product has the active ingredient in it and is safe.

Amazon.com sells over fifty different butterbur-containing products. A Google search results in twenty butterbur products. One costs $3.59; another, $57.99. Both contain sixty 75-mg capsules "standardized to at least 15% petasin." Interestingly, the less expensive product's label states that it is PA free, whereas the more expensive one does not. The consumer might wonder why there is such a huge price difference, especially because the labels imply the less expensive one is safer. Because these products are not regulated, it is not possible to know with confidence that what is inside the bottle is what is described on the outside.

Butterbur summary. There is some evidence that butterbur might be effective in decreasing the frequency of periodic migraine headaches, though the evidence is sparse and not strong. But there is also evidence that it may not be safe. The discussion of butterbur is inconsistent among the six books, and it is recommended for use in numerous conditions for which there is no evidence of effectiveness or safety. Buying a product labeled "butterbur" can be treacherous.

The Elephant in the Room

Butterbur has served as an excellent example of the potential benefits and known concerns that can be generalized to a wide range of herbal remedies recommended in the National Geographic Society books. These characteristics include:

- There is some evidence of benefit, though it is weak. The few clinical trials are small and of short duration.
- Robust safety and efficacy studies with subsequent regulatory approval are absent.
- Many of the recommendations for use have no evidence to support them.
- The incidence of adverse reactions is not quantified.
- Interactions with other herbal preparations and pharmaceuticals receive little attention.
- Dose-ranging studies have not been done, so the most effective, and safe, dose is unknown.

But beyond these issues demonstrated by butterbur is another major concern about herbal products, one that the NGS books ignore. The elephant in the room is that the lack of regulation of potency and purity results in products of uncertain quality. Unlike regulated pharmaceutical medicines, the products discussed in these books are subject to numerous variables that erode confidence, not only in quality and consistency but even in whether an active ingredient is present.

- Without regulation and post-production monitoring, the strength and purity of individual batches of herbal supplements is not ensured.

- Herbal potency may vary from manufacturer to manufacturer and batch to batch because of differences in the plant's harvesting methods and time, geographical locations, climate, storage conditions, and variations in solvents, temperature, and extraction time.
- Poor quality control allows contaminants—arsenic and lead have been detected in herbal products, for example.
- Deliberate adulteration with pharmaceutical ingredients frequently occurs—sildenafil (Viagra) has often been found in male sexual enhancement products.

THE *ALTERNATIVE MEDICINE REVIEW* MONOGRAPH OMITTED THE IMPORTANT INFORMATION THAT THE ONE (AND APPARENTLY ONLY) BUTTERBUR GASTROINTESTINAL STUDY WAS DONE IN RATS.

The results of the previously mentioned study that found one-third of the butterbur products analyzed had toxic levels of PA in them are as frightening as they are instructive. Equally concerning is that a recent analysis of an FDA database found 776 adulterated dietary supplements from 146 different companies during the years 2007–2016. That averages out to one fraudulent product discovered every five days for ten years. Though a majority of the products were for sexual enhancement or weight loss, it should raise red flags for purchasers of any "dietary supplement." None of these issues is addressed in any substantive or comprehensive way in the six NGS books.

Multiple problems ensue when inaccurate health product information is advanced. The consumer may not receive any benefit, as the product may not do what is claimed. The product itself may directly cause harm. It may interact with other medications and herbal preparations. Delay while taking the ineffective product until proper treatment is obtained may worsen the condition or increase the likelihood of more serious harm. Money could be wasted.

Products promoted to improve health should have undergone thorough scientific and clinical evaluations that demonstrate sufficient evidence of safety and efficacy, and production and post-marketing surveillance should be regulated. The authors and publishers of books offering health advice should scrupulously ensure their messages are evidence-based and can do no harm. Unfortunately, the NGS books fall short.

Conclusion

The editors of the National Geographic Society should reconsider their "natural remedies" publishing enterprise. Producing books full of claims that lack evidence and don't meet even minimum scientific standards belies the NGS's stated "passion for science." Some of the advice can harm. The inconsistencies among the books are troubling and weaken any argument that they are providing "information people can trust." The National Geographic Society should not sully its reputation by promoting health practices and products not supported by credible scientific evidence. ■

Further Reading

Chugh, N.A., S. Bali, and A. Koul. 2018. Integration of botanicals in contemporary medicine: Road blocks, checkpoints and go-ahead signals. *Integrative Medicine Research* 7: 109–125. Excellent review article with 225 references.

Diener, H.C., F.G. Freitag, and U. Danesch. 2018. Safety profile of a special butterbur extract from *Petasites hybridus* in migraine prevention with emphasis on the liver. *Cephalalgia Reports* 1: 1–8.

Tachjian, A., V. Maria, and A. Jahangir. 2010. Use of herbal products and potential interactions in patients with cardiovascular diseases. *Journal of the American College of Cardiology* 55: 515–525. A thorough look at the potential dangers of herbal products.

Tucker, J., T. Fischer, L. Upjohn, et al. 2018. Unapproved pharmaceutical ingredients included in dietary supplements associated with US Food and Drug Administration warnings. *JAMA Network Open* 1(6): e183337.

Wells, R.E., J. Beuthin, and L. Granetzke. 2019. Complementary and integrative medicine for episodic migraine: An update of evidence from the last 3 years. *Current Pain and Headache Reports* 23:10.

Victor Benson, MD, is a retired family physician whose career was at Kaiser Permanente in Southern California. There he performed many administrative and clinical leadership functions that included evidence-based clinical guideline development, cardiovascular disease prevention population management, founding and directing the lipid management program, and chairing the Pharmacy and Therapeutics Committee. He is a Volunteer Clinical Instructor at the David Geffen School of Medicine at UCLA.

National Geographic Book Is a 'Natural' Disaster

HARRIET HALL

The National Geographic store proclaims, "This authoritative guide to the foods, herbs, spices, essential oils, and other natural substances that alleviate common ailmnts will enhance your life—from treating illness to sharpening the mind, losing weight, cleaning the home, enhancing pregnancy, and reducing the effects of aging."

No, it won't. The information in *Nature's Best Remedies* is biased, incomplete, unscientific, and sometimes even dangerous. I am a longtime subscriber to *National Geographic* magazine; I enjoy the great photography and always assumed the articles provided reliable information. I can no longer trust it; this book was a bitter disappointment.

NATIONAL GEOGRAPHIC
Explore Healing Properties of Plants
Discover Remedies to Ailments
Uncover Ways to Stay Healthy Naturally
Nature's Best
REMEDIES
THE WORLD OF HEALTH AND HEALING ALL AROUND YOU

Nature's Best Remedies. By Nancy J. Hajeski. National Geographic Books. 2019. ISBN 978-1426218927. 318 pp. $35.00.

The author, Nancy J. Hajeski, is a fiction and nonfiction writer with no medical or scientific credentials. The foreword is by Tieraona Low Dog, MD, an integrative medicine specialist. As Mark Crislip famously said, "If you integrate fantasy with reality, you do not instantiate reality. If you mix cow pie with apple pie, it does not make the cow pie taste better; it makes the apple pie worse." *Integrative medicine* is a marketing term designed to infiltrate quackery into science-based medicine. It accepts poor quality evidence and tries to co-opt some of the standard recommendations of mainstream medicine such as diet, exercise, and lifestyle changes, giving the impression that only integrative medicine appreciates their value!

The book subscribes to the naturalistic fallacy—the idea that a natural remedy is inherently better than a pharmaceutical one. That concept is demonstrably false. It doesn't matter whether a remedy comes from a plant or a laboratory; what matters is whether it is effective and safe. Around half of pharmaceuticals were derived from plants. Drug companies improved the natural remedy using science. They identified and isolated the active ingredient, developed a pure version with a controlled dosage, and often synthesized the active compound and altered it to improve its efficacy and safety.

Nature's Best Remedies is unreliable. I have long relied on another resource that is much more trustworthy and complete, the *Natural Medicines Comprehensive Database.* It covers all the published research (with citations) on vitamins, minerals, and dietary supplements. It lists adverse reactions, safety concerns, drug interactions, warnings, and more. It rates each natural medicine for effectiveness and safety. Only 5 percent are rated as "effective," and almost all of those are vitamins, minerals, and medicines that are also available as prescription or over-the-counter products approved by the Federal Drug Administration (FDA). Others are rated *likely or possibly effective*, *likely or possibly ineffective*, or *ineffective*. Safety ratings are *likely or possibly safe*, *likely or possibly unsafe*, or *unsafe*. A great many entries say there is insufficient reliable evidence to provide any rating.

In contrast, this National Geographic book describes only "health benefits." It mentions that there are positive studies and studies that indicate that a remedy "may" have beneficial effects, but some of these are animal or in vitro studies. It provides no citations or references to help readers locate the studies and evaluate the claims.

THE INFORMATION IN *NATURE'S BEST REMEDIES* IS BIASED, INCOMPLETE, UNSCIENTIFIC, AND SOMETIMES EVEN DANGEROUS.

It fails to mention negative studies or adverse reactions or interactions with other remedies. It does not warn when a remedy might be unsafe during pregnancy or breastfeeding.

If National Geographic had presented this as a coffee table book describing folklore and belief systems, illustrated by a lot of pretty pictures, I wouldn't have objected. But they presented it as an evidence-based review of the top natural medicinal remedies and the natural medicines as effective, without mentioning what Paul Harvey would have called "the rest of the story." This is superstition, not science. It is misleading, incomplete, and potentially dangerous. Nothing in this book can be trusted without confirmation from other, more reliable sources. National Geographic let us down. They should be ashamed. ■

For Dr. Hall's full review, see skepticalinquirer.org.

Harriet Hall, MD, is a contributing editor and columnist for the Skeptical Inquirer and a weekly contributor to and one of the editors of the *Science-Based Medicine* blog. She is coauthor of the textbook *Consumer Health: A Guide to Intelligent Decisions.*

Skeptical Inquirer
The Magazine for Science and Reason

Skeptical Inquirer is now available for digital-only subscription.

Our digital subscribers can read the full contents of each new issue and have total access to Skeptical Inquirer's entire online archive, dating back to 1976, all without receiving physical magazines by mail.

Current print subscribers also have full digital access to our online articles and archives. Print subscribers can access the digital content by visiting skepticalinquirer.org, clicking "Activate" in the top-right corner of your screen, and then filling out the corresponding form. Our digital content is viewable on desktop, laptop, tablet, or smartphone.

Consider giving a gift subscription to a young person you know who might appreciate Skeptical Inquirer's content but prefers to read on a digital device—or to a friend overseas.

skepticalinquirer.org

Quackery at WHO: A Chinese Affair

China has aggressively and successfully introduced its prescientific traditional medicine into the World Health Organization (WHO). This phenomenon, evident since 2002, has become increasingly worrisome and urgent with inclusion of traditional Chinese medicine in WHO's update of *International Classification of Diseases*.

CEES N.M. RENCKENS
AND THOMAS P.C. DORLO

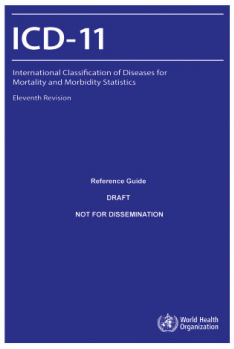
"Traditional Chinese medicine is a 'gem' of the country's scientific heritage."
—President of China Xi Jinping

Since its founding in 1948, maintenance of the *International Classification of Diseases* (ICD) report is among the many tasks allocated to the World Health Organization (WHO). The ICD was initially started by the U.S. International Statistical Institute as the International List of Causes of Death. More than 100 countries worldwide use the ICD currently for morbidity and mortality statistics. But the ICD also serves an important financial role: the ICD is being used as a basis for reimbursement policies and allocation of national funding for almost 70 percent of global healthcare costs.

On June 18, 2018, the WHO published a draft of the eleventh version, ICD-11. New additions to the ICD-11 included "gaming disorder," a reclassification of gender dysphoria, and the chance to register diagnostic terminologies and syndromes used in so-called traditional medicine (TM). In January 2019, representatives of WHO member states further prepared the embedding of the proposed ICD-11, which was presented to the World Health Assembly in May 2019. If everything goes as planned, the new ICD-11 will be put into use on January 1, 2022. Curiously, according to member state representatives, no discussion was expected in the Assembly on this highly remarkable extension of the ICD. And indeed their prediction came true: the proposal was accepted unanimously and without any debate.

Traditional Chinese Medicine in the ICD-11

The WHO has dedicated a full chapter in ICD-11 to traditional Chinese medicine (TCM) diagnoses and syndromes. This means that from 2022 onward, official reporting can be performed for diagnoses such as the *bladder meridian syndrome*, which is supposedly characterized by severe headache, neck- and lower-back pain, excessive tearing, a stuffy nose, and a numb little toe. Another example: *triple energized meridian dysfunction*, a syndrome that it claims is characterized by deafness, tinnitus, swelling and obstruction of the throat, and reduced use of the ring finger (Hong-Zhou et al. 2013).



Given the pseudoscientific character of TCM and the impossibility of integrating this Chinese taxonomy and its concepts into modern medicine, we had expected a substantial turmoil following the announcement of ICD-11 by the WHO (WHO 2018). However, it attracted, with a few exceptions, very little attention and commotion, even in the medical community (Gorski 2018; *Scientific American* Editors 2019; WHO 1984; WHO 1993; Maassen 2018).

What Preceded ICD-11?

A retrospective look at the history of the WHO illustrates how TM and in particular TCM gained a foothold within the WHO. The Alma Ata conference in 1978, with its slogan "Health for all in the year 2000," stated that TM had a place in primary care. Between 1984 and 2007, the WHO made several attempts to standardize the various nomenclatures used within TCM as practiced in China, Japan, and Korea with the aim of promoting its acceptance. The last official WHO-endorsed standard on this topic dates from 2007 and included the description of fourteen meridians, 361 classical acupuncture points, eight extra meridians, forty-eight extra points, and fourteen acupuncture lines on the skull (WHO 2007).

The WHO Traditional Medicine Strategy 2002–2005 policy plan was published in May 2002. The document praised countries such as China, North Korea, and South Korea because they managed to have TM fully integrated into their health system. It presented the native flora as an undiscovered source of new medicines, of which the supposed benefits should be protected as intellectual property. The resentment against "Western" medicine can be felt on every page. Dr. Xiaorui Zhang, a former barefoot doctor[1] who later studied medicine in the United States, was one of the main persons responsible for this policy plan, which became "the first global strategy on traditional and alternative medicine." When we confronted then Dutch Minister of Health Hans Hoogervorst with this scandalous WHO endorsement of TCM, he plainly replied that every member state is free to ignore the recommendations by the WHO, which has no supranational powers.

THE DUTCH REPRESENTATIVES AT WHO DO NOT HESITATE TO POINT OUT THAT POLICY RECOMMENDATIONS BY WHO ARE NOT BINDING FOR ANY OF ITS MEMBER STATES.

The report *Acupuncture: Review and Analysis of Reports on Controlled Clinical Trials*, also under WHO auspices, appeared in 2003. It asserted that the efficacy of acupuncture in acute dysentery, hay fever, leucopenia, anovulation, and rheumatoid arthritis, among other ailments, had been proven. This uncritical review was performed without any kind of peer review by non-acupuncturists. In 2014, this scandalous report was tacitly removed from the WHO website, but it was never formally retracted. At the end of November 2004, Zhang distributed a similar draft report on homeopathy. It was offered for review to a few homeopaths, but its contents were leaked. This overview, *Homeopathy: Review and Analysis of Reports on Controlled Clinical Trials*, was as prejudiced as the report on acupuncture: various indications were mentioned for which efficacy of homeopathy was said to have been demonstrated, e.g., tropical diarrhea in children, hay fever, incipient flu, fibromyalgia, and intestinal paralysis after abdominal surgery. The report also proposed unscientific and mythological explanations for the mechanism of action of submolecular diluted substances (diluted to the point where not even a single molecule of the alleged effective ingredient should remain). It never came to a final version of the report, possibly also as a result of criticism originating from Dutch and Flemish quackery fighters (Renckens 2005). WHO TM coordinator Zhang wrote a weak reply in the Dutch daily newspaper *NRC Handelsblad* in answer to our criticism (Zhang 2005), but nevertheless the WHO homeopathy report was aborted. We reported this affair in the Skeptical Inquirer (Renckens et al. 2005).

In 2014, the WHO Traditional Medicine Strategy 2014–2023 appeared with content comparable to that of its predecessor from 2002: no reliance on evidence; instead, an emphasis on "real-life studies," reimbursements by health insurers, and commercialization of TCM (Dorlo et al. 2015).

TCM as Part of the ICD

Already in 2010, the WHO had indicated that it was aiming to merge TCM-diagnoses into the ICD (WHO 2010). This planned integration of the International Classification of Traditional Medicine (ICTM) into the "family of other WHO-classifications" would eventually "enable unification of the conventional and the traditional medicine classifications" and "will facilitate enhanced acceptance" of TM, as stated in the WHO Background Document on ICTM (WHO 2010). On March 3, 2011, the WHO published the list of experts who should further give shape to the ICTM. Among a variety of Asian TCM-enthusiasts there was also the Dutch ethnopharmacologist Peter de Smet. The planned ICTM was going to be based on the WHO International Standard Terminologies on Traditional Medicine in the Western Pacific from 2007, which contains around 3,000 items. What the exact details will be of the TM-modules that will be featured in the ICD-11 is still unknown.

Outside the WHO domain, the Chinese government is pursuing a similar agenda—TCM as an export product—by attempts to have an International Organization for Standardization (ISO) certification for, for example, TCM herbs and sterilization procedures for acupuncture needles (Dorlo and Timmerman 2009). These attempts fit the overall goal of the Chinese government to enlarge China's herbal exports and to gain recognition for Chinese herbs, given that the Chinese herbs will never be able to receive a formal medical product registration for European or U.S. markets due to the "strict" requirements to demonstrate efficacy and safety. At this moment, ISO standards provide a false aura of reliability to thirty-three TCM products and "activities" of planting, from the sowing of ginseng seeds to an infrared moxibustion device, and another forty-three standards are in the making (International Organization for Standardization 2019). In a direct meeting between then WHO Director-General Margaret Chan and President Xi Jinping, the latter said straightforwardly that he counted on a good collaboration between China and WHO and that he expected the WHO would help with "promoting TCM and Chinese herbs to foreign countries." The Chinese government lobbied Chan repeatedly while attempting to increase TCM's acceptancy and suitability for export. This culminated, among other things, in the publication of purely commercial paid advertising supplements in *Nature* in 2011 and *Science* in 2014, in which the pseudoscientific articles received an approval in a preface written by then WHO Director-General Margaret Chan. (See David Gorski, "*Science* Sells Out: Advertising Traditional Chinese Medicine in Three Supplements," Skeptical Inquirer, May/June 2015.) In 2017, the value of the growing Chinese export of medicinal herbs had peaked to $295 million (Cyranoski 2018).

Promoting Quackery

There are no public debates in the World Health Assembly around WHO policy plans, such as the ICD-11, but these plans are prepared by WHO administrators, and their acceptance is the result of consensus. The Dutch representatives at WHO do not hesitate to point out that policy recommendations by WHO are not binding for any of its member states and the TM modules in the ICD-11 will therefore probably remain unused in the Netherlands and many other Western countries. Nevertheless, these kinds of consensus approvals and the apparent cynicism among WHO member state representatives grants international and highly regarded status to quacks and makes their practices potentially more viable for monetary reimbursement. This is especially so as the ICD-11 is used as a blueprint for this in many countries worldwide. Countries with less functional medical regulatory authorities might embrace TCM on the basis of the explicit WHO approval. TCM is already spreading widely across Africa (*The Economist* Editors 2018). If patients with HIV, tuberculosis, or malaria seek treatment at the increasing number of TCM clinics, they are risking their lives. For HIV, it has been shown that the complementary use of TM—in this case traditional medicine of African origin—has a negative effect on the success of conventional antiretroviral treatment, even if both approaches are combined (Moshabela et al. 2017).

THE TRADITIONAL MEDICINE MODULES IN THE ICD-11 WILL PROBABLY REMAIN UNUSED IN THE MANY WESTERN COUNTRIES. NEVERTHELESS, THESE APPROVALS GRANT INTERNATIONAL AND HIGHLY REGARDED STATUS TO QUACKS.

Instead of cheering the use of TM, the WHO should strive to ensure that truly effective medical care, unhindered by TM mythology, becomes available and accessible worldwide, a situation that can be achieved by a fair and global distribution of wealth and economic growth. Critical WHO officials and member state representatives

who favor evidence-based medicine should operate with this state of mind and should be instructed by their governments to distance their countries—for instance with minority reports disagreeing with reprehensible WHO initiatives.

Our Published Paper and a Rebuttal

An article similar to this one was published by us in Dutch in the Dutch medical journal *Medisch Contact* on February 28, 2019 (Renckens and Dorlo 2019). Peter de Smet, the aforementioned expert member of the ICTM Project Advisory Group (WHO 2011), reacted and defended the inclusion of TM in the ICD by arguing that TM diagnoses and interventions are still widely used worldwide and that this implementation could yield useful epidemiological information. The exact details of the TM inclusion in the ICD-11 are still shrouded with mystery, but the fact that even interventions would be part of the ICD-11 was a surprise to us. Apparently, the aforementioned WHO International Standard Terminologies on Traditional Medicine in the Western Pacific (2007) will be used for this purpose. In this document, twenty-one therapeutic principles and 347 treatment methods are mentioned. Two examples of these treatments: the *eight methods*, a collective term for diaphoresis, emesis, purgation, mediation, warming, clearing, tonification, and resolution; or: *disperse wind and discharge heat*, a therapeutic method to treat externally contracted wind with interior heat by using exterior-releasing medicinals and heat-clearing medicinals in combination. In addition, de Smet insisted that the efficacy of TM interventions for certain TM diagnoses could be investigated. However, to his regret, creation of the list of TM interventions had been delayed.

Our publication also caught the attention of Henk van Gerven, a member of the Dutch parliament on behalf of the Socialist Party. He asked the Minister of Health various written questions about the WHO policy and general state of affairs. The Minister stated that, within WHO, the Netherlands did not provide an opinion on TM in the ICD and left that to member state Romania, which responded on behalf of all the EU member states. The Western countries chose to comply with the wishes of the countries where TM is still being used. He also pointed out that entering the TM data for national health statistics is optional and that the Netherlands will further ignore this option. The Minister also stated that China's push for expansion of the ICD had been driven, at least partially, by commercial considerations, i.e., export of TCM products.

COUNTRIES WITH LESS FUNCTIONAL MEDICAL REGULATORY AUTHORITIES MIGHT EMBRACE TRADITIONAL CHINESE MEDICINE ON THE BASIS OF THE EXPLICIT WHO APPROVAL.

Conclusion

As expected, the ICD-11 was adopted at the 72nd World Health Assembly, and it will be implemented as planned in 2022. Although WHO spokesman Tarik Jasarevic stated that the inclusion of TM in the ICD is not an endorsement of its scientific validity, proponents of complementary and alternative medicine (CAM) will of course misuse the inclusion as such (Hunt 2019). A WHO News Release on this subject stated that the "ICD-11 is now fit for many uses, including clinical recording, primary

care, patient safety, antimicrobial resistance, resource allocation, reimbursement, casemix, in addition to mortality and morbidity statistics." The enormous goodwill for TM and CAM within the WHO is evidenced by the warm welcome given quacky organizations such as EUROCAM (representing, among others, various homeopathy associations), the World Naturopathic Federation, and the World Chiropractic Association (World Naturopathic Federation 2019). All these organizations were invited by the WHO to attend the World Health Assembly, where it released the WHO Global Report on Traditional and Complementary Medicine 2019. This report calls the fact that 88 percent of all member states have formally developed policies, laws, regulations, programs, and offices for TM and CAM "a unique milestone."

That political and economic considerations play a more important role within WHO than medical evidence-based science remains difficult to comprehend and accept. This unfortunate fact should lead to discussion and reflection on the role and position that member states have within the WHO. That prescientific mythological concepts now have gained a serious position in the WHO morbidity and mortality classification and statistics can be regarded as a direct failure of the political consensus-strategy. ■

Note

1. Barefoot doctors are farmers who received minimal basic medical and paramedical training and worked in rural villages in China. Their purpose was to bring health care to rural areas where urban-trained doctors would not settle.

References

Cyranoski, D. 2018. Why Chinese medicine is heading for clinics around the world. *Nature* 561(7724): 448–50.

Dorlo, T.P.C., W. Betz, and C.N.M. Renckens. 2015. WHO's strategy on traditional and complementary medicine. A disgraceful contempt for evidence-based medicine. Skeptical Inquirer 39(3): 42–45.

Dorlo, T.P.C. and H. Timmerman. 2009. *China vaart wel bij kruidenexport. Medisch Contact* 64(46): 1900–3.

Gorski, D. 2018. The World Health Organization: Embracing traditional Chinese medicine pseudoscience in ICD-11 (blog entry). *Respectful Insolence* (October 4). Available online at https://respectfulinsolence.com/2018/10/04/the-world-health-organization-embracing-traditional-chinese-medicine-pseudoscience-in-icd-11/.

Hunt, K. 2019. Chinese medicine gains WHO acceptance but it has many critics. CNN. Available online at https://edition.cnn.com/2019/05/24/health/traditional-chinese-medicine-who-controversy-intl/index.html.

Hong-Zhou, W., F. Zhao-Qin, and C. Pan-Ji. 2013. *Introduction to Diagnosis in Traditional Chinese Medicine*. Hackensack: World Century Publishing Corporation.

International Organization for Standardization. 2019. ISO/TC 249 Traditional Chinese Medicine. Available online at https://www.iso.org/committee/598435.html.

Maassen, H. 2018. WHO erkent traditionele Chinese geneeskunde. Medisch Contact 72(40):6.

Moshabela M., D. Bukenya, G. Darong, et al. 2017. Traditional healers, faith healers, and medical practitioners: The contribution of medical pluralism to bottlenecks along the cascade of care for HIV/AIDS in Eastern and Southern Africa. *Sexually Transmitted Infections* 93(Suppl 3): e052974. doi:10.1136/ sextrans-2016-052974.

Renckens, C.N.M. 2005. *Hoed u voor de homeopaten bij de WHO. NRC Handelsblad* (March 31).

Renckens, C.N.M., and T.P.C. Dorlo. 2019. *Hoe China de WHO misbruikt voor zijn eigen agenda. Medisch Contact* 73(9): 23–25.

Renckens, C.N.M, T. Schoepen, and W. Betz. 2005. Beware of quacks at the WHO. Skeptical Inquirer 29(5): 12–14.

Scientific American Editors. 2019. The World Health Organization gives the nod to traditional Chinese medicine. Bad idea. *Scientific American* 320(4): 6.

The Economist Editors. 2018. La Clinique Chinoise. Chinese medicine is on the rise in Africa. *The Economist* (November 8).

WHO. 1984. Standard Acupuncture Nomenclature. Geneva: WHO.

———. 1993. Standard Acupuncture Nomenclature Second Edition. Manilla: WHO.

———. 2007. International Standard Terminologies on Traditional Medicine in the Western Pacific. Geneva: WHO.

———. 2010. Background Document on ICTM. Traditional Medicine in Health Information Systems: Integrating Traditional Medicine into the WHO Family of International Classifications. WHO/HSI/CTS 2010/03. Available online at https://sites.google.com/site/whoictm/home/ICTMProjectPlan.pdf.

———. 2011. ICTM Expert List of Participants. Available online at https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnx3aG9pY3RtfGd4OjQ2MWZjMDExZmYwNmNmZWY.

———. 2018. Press release: WHO Releases New International Classification of Diseases. Available online at http://www.who.int/news-room/detail/18-06-2018-who-releases-new-international-classification-of-diseases-(icd-11).

World Naturopathic Federation. On Facebook at https://www.facebook.com/1444688405800272/posts/2422802201322216?s=736930180&sfns=mo.

Zhang X. 2005. WHO propageert homeopathie niet. *NRC Handelsblad* (April 8).

Cees N.M. Renckens, MD, PhD, is a retired gynecologist. He was chairman of the Dutch Society against Quackery from 1988 until 2011 and at present is honorary chairman of the Society and member of its board.

Thomas P.C. Dorlo, PhD, is a senior scientist and clinical pharmacology expert at the Netherlands Cancer Institute and member of the board of the Dutch Society against Quackery.

Both contributed previously to SI, writing on quackery and alternative medicine.

Magic Waters

There is a long history of belief in the supposed "magical" powers of water. Some are "natural" attributes considered miraculous, talismanic, or legendary; others involve waters supposedly "imbued" with "energy" or "powers" such as memory (homeopathy). All are examples of magical, supernatural thinking trumped by science.

JOE NICKELL

Water's ability to cleanse obviously made it a natural choice for ritual washing (such as baptism in Christianity and *mikvah* in Judaism). And its power to soothe a minor burn, quench a thirst, or provide other relief naturally inspired further medicinal uses. Belief in the supernatural extended the supposed powers of water in various ways—hence this overview of what we may simply call "magic waters." It is divided into two parts, Natural Water and Imbued Water.[1]

Natural Waters

The "natural waters" category of magic waters consists of those directly produced by nature—no matter how people may regard them. Examples are those that are "miraculous" (such as the River Jordan or the spring at Lourdes), talismanic (say, kept in a sealed vial as a charm), mineral-enriched (such as those of secular "healing" springs), and fakeloric (such as the pseudo-legendary Fountain of Youth in St. Augustine, Florida).

Miraculous

So important was water to the ancients that temples—and even cities and empires—were built around it. Often considered sacred, these rivers, lakes, and springs played central roles in the lives of worshippers.

Such was the status of the Jordan River, which connects the Dead Sea and the Mediterranean and is sacred to two faiths. For Jews, it miraculously parted for Joshua to lead his people on dry ground across the Jordan and into the Promised Land (Joshua 3–4). For Christians, it was the water in which John the Baptist baptized Jesus (Matthew 3:13–16). It was also, for both, a source of healing, as told in 2 Kings 5:14, where Naaman bathed in Jordan's waters and was cured of leprosy.

In ancient Greece, springs were believed to have supernatural powers because they were the dwelling places of gods. (Sacred waters can be differentiated from secular "healing" springs, discussed in a subsequent section.)

Around the world are alleged "miracle" springs, many promoted by Roman Catholics. The most famous of these is Lourdes in southern France. There, in 1858, fourteen-year-old Bernadette Soubirous (1844–1879) claimed to see the Virgin Mary, who directed her to the spring at the back of a grotto. Soon tales of miraculous healings surfaced, attributed to Bernadette. Ironically, the healing powers of the water were not for her, who died young. That fact did not provoke much skepticism, and she was nevertheless canonized as a saint in 1933.

Skeptics observe that the criterion for proclaiming cures to be miraculous is that they are "medically inexplicable," but that is only engaging in a logical fallacy known as an argument from ignorance. (That is, one cannot draw a conclusion from a lack of knowledge.) Moreover, there are other explanations for apparent cures: misdiagnosis, psychosomatic conditions, prior medical treatment, the body's own healing power, and other effects.

Supposed cures were once certified by the medical bureau of Lourdes (beginning in 1884). However, in 2008 there was something of a rebellion by the doctors, who objected to being in the "miracle" business. They determined from then on only to indicate whether cases are "remarkable"—since remarkable healings can happen to anyone, independent of religious shrines and supposed magical water (Nickell 2008).

Talismanic

It is only a short step from conviction that the application of water from a miraculous source can be curative to the belief that a small amount contained as a talisman (for example, in a little vial or bottle) can also effect cures. (A talisman is an object believed to have magical properties, such as bringing good luck or offering protection.) For talismanic power the water does not actually need to be *used*; supposedly it works its magic even from the closed container.

It should not be surprising that pilgrims visiting the Holy Land during the Byzantine era could purchase small *ampulla*—bottles now known as "pilgrim jars"—suitable for obtaining some sacred water, as from the Jordan River, to take home as a talisman or souvenir. For Christians, the bottles were embossed with crosses—and so might alternately hold sacred oil from a lamp at the Holy Sepulcher, a splinter from the (alleged) True Cross, or other holy item. There were similar pilgrim jars for Jews as well, embossed with menorahs (Goudeau et al. 2014).

Pilgrim jars were especially common during the period 600–900 CE, like the one shown here (Figure 1) from the author's collection (measuring about 3.5" high). Of course, we can only say it *might* have held magical water from the Jordan River itself, or from a sacred spring, or the like.

Figure 1. Natural waters. From left to right are containers for "miraculous" water–as from the River Jordan (Byzantine era pilgrim jar and "Jordan Water" bottle from 1901 Pan Am Exposition) and the spring at Lourdes (plastic figurine of Mary containing Lourdes Water and in front of it a boxed cross with drops of the water intended to be used talismanically); ca. 1930 amber bottle for White Rock Mineral Springs water; and a mid-twentieth century souvenir bottle of water from the pseudo Fountain of Youth in St. Augustine. (Author's photo: items from his collection.)

Shown with more certainty is the tiny 1.75" high bottle beside the pilgrim jar—it actually being embossed "JORDAN/WATER//PAN AM/1901." As indicated, such vessels were souvenirs of the Pan American Exposition, a world's fair held in Buffalo, New York, from May 1 through November 2, 1901. More than one eBay listing has opined that the bottles held "Holy Water," but I think these sources have jumped to a conclusion. I suspect the bottles held just what they say they did, no more or less, and were not exclusively for Catholics (like those bottles we will discuss presently). These bottles—whether thought talismans or not—show the popularity of Jordan water a century ago, and bottles of the venerated liquid are still sold.

Also shown in Figure 1 is a souvenir "Lourdes Cross" containing drops of water from the famous "miracle" spring. For the superstitious, this could represent combined talismanic powers—that of the cross itself and that also emanating from the water.

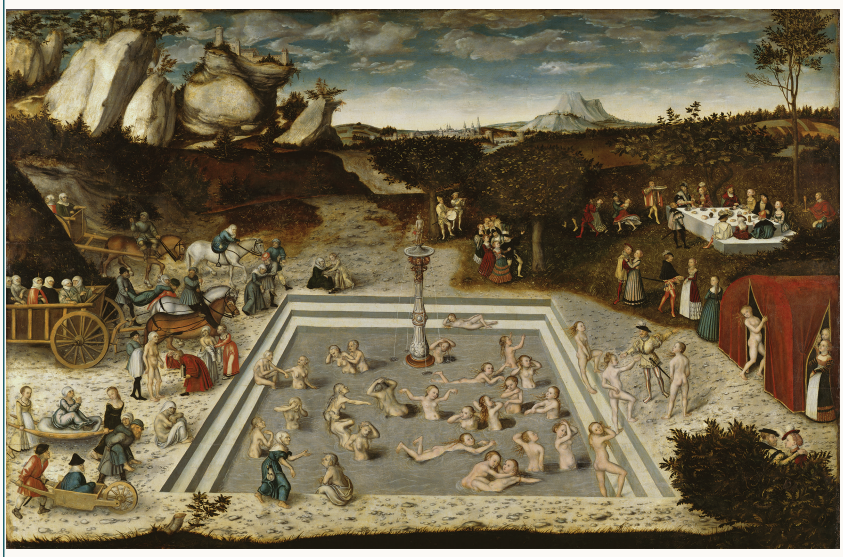
Mineral-Enriched

Among the earliest "healing" practices is hydrotherapy—the internal or external use of water for treating disease. Indeed, drinking from, or bathing in, springs, pools, or streams for therapeutic purposes predates recorded his-

Figure 2. Imbued waters. Left to right, front row: patented cross-shaped bottle for holy water; a homeopathic tincture with booklet; a magnet and vial for creating "magnetic" water. Back row: New Age pyramid for making pyramid-"energized" water; and a goblet with a mineral and set of "Healing Stones" for making "gem-informed" water. (Author's photo: items from his collection; healing stones gift of Barry Karr.)

tory. Ancient Greece and Rome placed therapeutic centers at mineral springs across their realms. In the Americas, too, native peoples also believed in the restorative powers of mineral waters; Aztec emperor Montezuma, for instance, used a spa called Agua Hedionda (Nickell 2005).

In my travels I have visited many famous spas around the world. A historic one at Pozzuoli, Italy (which I visited with investigator Luigi Garlaschelli), is in a volcano that formed 4,000 years ago and last erupted in 1198. It yields sulfurous steam that was considered beneficial for respiratory ailments, hot mud used to treat rheumatism, and thermo-mineral waters with widespread curative claims (Nickell 2005).



The Fountain of Youth, 1546 painting by Lucas Cranach the Elder.

AMONG THE EARLIEST "HEALING" PRACTICES IS HYDROTHERAPY—THE INTERNAL OR EXTERNAL USE OF WATER FOR TREATING DISEASE.

The emphasis at a great number of European and American springs was on the natural inclusions in the water: iodine to treat goiter, lithium for manic depression, etc., as well as assorted minerals in general, the springs often being billed as "health-giving mineral waters." Actually, most such springs (such as New York's celebrated Saratoga Springs) contain dissolved salts, and it became usual to set the level at fifty grains per gallon to justify the designation "mineral water." The beneficial effects were commonly debated and probably often negligible. With exceptions, most mineral springs simply offered a drink of cool water or a soothing bath along with the placebo effect.

The tallest bottle pictured in Figure 1 (measuring about 8" tall) is a rather typical one for mineral-springs water. Its label bills it as "Delicious/Sparkling/Healthful." It was "Lithiated and Carbonated" (i.e., contained additives), sold by the "White Rock Mi[nera]l Springs Co." of Waukesha, Wisconsin. Interestingly, the upper label instructs, "Lay this bottle on its side / Always cool before opening." This shows us the early bottles were corked (and so predate the modern crimped-metal cap known as a "crown cork"). When a bottle was laid on its side, the cork would be kept wet; otherwise, it would dry and shrink, and the pressure of the gas would cause it to "pop" out (hence the name "pop bottle") (Nickell 2011).[2] The earliest cork-stoppered soda bottles often had rounded bottoms so the bottles could not be stood upright.

Fakeloric

The legend of a "Fountain of Youth" may have originated in India. By the seventh century, the tale had arrived in Europe where it was widely discussed through the Middle Ages. In 1546, German Renaissance artist Lucas Cranach produced a popular painting of the miraculous spring. It depicts wrinkled, frail women entering the pool and exiting as young beauties on the other side. (But since the fountain spouting the water is graced with the statues of Venus and Cupid, it is really a metaphoric fountain of love—the true source of immortality.)

Earlier, reportedly, Spanish explorer Ponce de León (ca. 1460–1521) had searched for the fabled spring. Having accompanied Columbus on his second voyage to America (1493) and conquered Puerto Rico in 1509, he was rewarded with permission to search for a land called "Bimini." Supposedly, according to a Native American legend, that region had a fountain with marvelously curative water, and anyone who drank from it would never age. Ponce de León did land at St. Augustine and sailed through the Keys and on to Cuba but, finding nothing, abandoned his quest. Returning in 1521 intending to conquer the Native Americans and colonize Florida, he was mortally wounded by an arrow (Nickell 2005).

The spring that is now advertised as the one sought by

the conquistador lacks any historical or archaeological evidence of such a connection. It was a tourist attraction as early as the 1860s, but its present form awaited purchase by Luella Day McConnell in 1904. She had returned from the Klondike gold rush of the late 1890s with money and the nickname "Diamond Lil," and by 1909 she was selling promotional postcards and well water. Until her death in an auto accident in 1927, she regaled tourists with tall tales about the site. She was succeeded by Walter B. Frazier, who made it a great attraction ("Fountain" 2018).

The souvenir bottle shown in Figure 1 (measuring about 1.5" in diameter by 3.75" tall) is machine made and dates from about the middle of the twentieth century. I recall drinking from the Fountain of Youth myself as a boy, and I can only say, look at me now.

Imbued Waters

This second category of magic waters comprises those that have supposedly been imbued with alleged "energy" or "power." (They may be made with water that contains natural inclusions such as minerals or additives such as chlorine, etc., but they could also be made with distilled water. The important thing is that whatever may be added during the transformational process does not substantially remain; only the imbued power does. These waters are called Holy, homeopathic, magnetized, pyramid-"energized," and gem-"informed."

Holy water in a small bottles. Lourdes, France.

Holy

Holy water is blessed by a religious figure. In Catholicism, its use is nonscriptural, dating back to ca. 400 CE. It is used as a sacramental (recalling baptism), as well as a means of purification, blessing places and people, healing, and repelling evil. During the Middle Ages, holy water was kept under lock and key to prevent its theft for unauthorized magical practices ("Holy" 2018).

Some churches offer take-home holy water at external spigots. Otherwise it is found in a font, usually at the entrance of a church. (Unfortunately and ironically, these may become sources of viral and bacterial infection [Fields 2013].)

That holy water can repel evil has long been believed by Catholics. St. Theresa wrote, "I know by frequent experience that there is nothing which puts the devils to flight like Holy water" ("Holy" 2018). However, in my investigations of supposed demon-possessed houses—like that on which the horror movie *The Conjuring* (2013) is based—I have discovered that "demons" are best routed simply by learning the true facts behind an "outbreak" (Nickell 2016a).

In addition to Roman Catholics, Anglicans and Eastern Christians also use holy water, as do some other religious sects, including Buddhist and Hindu traditions. In modern Wicca practice, "holy water" may be any water held sacred to the user (e.g., that from a shrine or sacred spring), rainwater collected on a special day, or water "charged" by a full moon or eclipse—among many possibilities. (I am omitting here those with added herbs or other substances) ("Magic" 2018).

Homeopathic

A type of "alternative" medicine, homeopathy takes the idea of magic water in an incredible (i.e., not credible) direction.

Homeopathy was created by Samuel Hahnemann in Germany in 1796 based on his belief that "like cures like"—that a substance capable of causing disease symptoms in a healthy person can cure symptoms in a sick person. Moreover, Hahnemann advocated "homeopathic dilution" by which the supposedly curative substance was diluted and re-diluted—in water or alcohol—to an extreme degree. In fact, scientists observe that the remaining amount of a supposedly curative substance is so infinitesimal that it cannot have any effect because not a single molecule of the original remains!

In other words, one is left with water that is just water, although homoeopathists insist the water has a "memory"—a claim that is scientific nonsense. So homeopathic remedies, while worthless, are not harmful—right? Un-

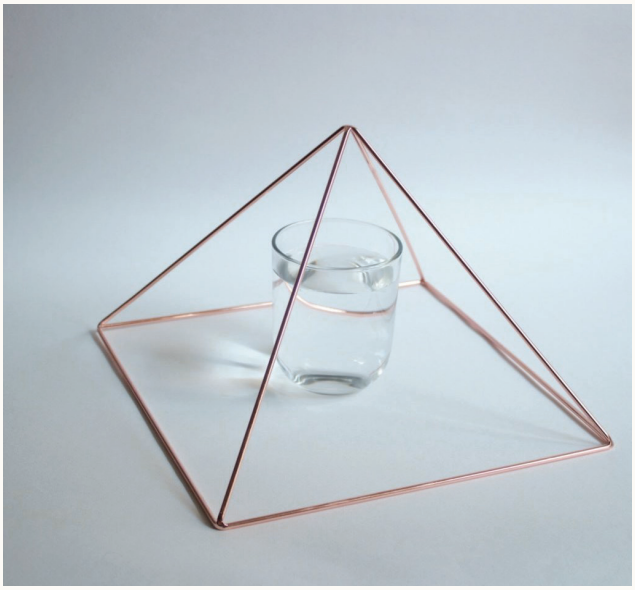
fortunately, no. While homeopathic products may contain only water, there are exceptions of which buyers should beware. For instance, several brands of homeopathic teething products were discovered to additionally contain belladonna (a.k.a. "deadly nightshade"). While that is allegedly used in trace dosages, supposedly to ease inflammation, laboratory analysis showed some of the products contained varying amounts of the potentially toxic ingredient. Relatively unregulated, the $6.4 billion homeopathic industry is facing increasing scrutiny by federal drug overseers (Nickell 2016b). In 2018, our international organization, the Center for Inquiry (CFI), initiated a lawsuit against CVS Pharmacy for fraud for advertising and selling useless homeopathic "remedies" (Brayton 2018). In May 2019, CFI served a similar lawsuit against Walmart (Center for Inquiry 2019; also see News and Comment, this issue).

Magnetized

German physician Franz Anton Mesmer (1734–1815) postulated an invisible natural force in all living beings called "animal magnetism." It was later termed *mesmerism*, and it is now known that Mesmer was inadvertently using hypnotic suggestion to successfully relieve "the hysterical symptoms of susceptible young females" (Lyons and Petrucelli 1978, 489).

In his experiments, Mesmer used iron magnets and water "magnetized" by them for healing, and patients reported feeling "unusual currents" flowing through them. Later, Mesmer discovered he could achieve the same effect by merely moving his hands above his patients—the result of what is now understood to be the power of suggestion ("Franz Mesmer" 2018).

Today, various questionable therapies involve magnets and "magnetized" water. In fact, only iron and some other metals can be permanently magnetized. An external magnetic field applied to water will exert only a miniscule effect, and that goes away upon removal of the external field. Quackwatch's Dr. Stephen Barrett (1998) says a marketed "Magnetic Mug" would cease to have even a very tiny effect "as soon as the liquid leaves the mug." Barrett goes on to call the mug claims "imaginative nonsense." Any pain relief or other alleged beneficial effect would be attributable to suggestion (i.e., the placebo effect).



Pyramid 'Energized'

Launched by the pseudoscientific book *Psychic Discoveries Behind the Iron Curtain* (Ostrander and Schroeder 1970, 366–376), the supposedly mystical power of the pyramids became an American craze of the 1970s and beyond. Supposedly, small models of the Great Pyramid of Cheops generated some mysterious power that the authors, in New Age fashion, referred to as "energy."

Initially based on a Czechoslovakian patent, models of cardboard, sticks, wire, and other materials were alleged to sharpen razor blades(!), preserve food (especially "mummify meat"), impart a mellower taste to wine, perk up houseplants, and perform other marvels, including (when worn like a dunce cap) relieving headaches and restoring vitality. Not surprising, scientific evidence was lacking (Nickell 2004, 200–203).

On an investigative tour of Russia in 2001 (Nickell 2004, 200–206), I found pyramid power on the rise—almost literally: one pyramid I visited (the tallest of about twenty) towered forty-four meters (about 144.4 feet, or some twelve stories). It was constructed of translucent Plexiglas panels over a wood framework. It was closed when I arrived with Russian friends, Valerii Kuvakin and his wife, Uliya, but a custodian consented (following a small bribe) to show us around. The pyramid was largely empty but held cases of bottled water that were supposedly being energized for curative purposes.

A booklet I bought titled (in translation) *Pyramids of the Third Millennium*, foresaw a new physics, a new biology, and so on, even claiming that the new pyramids had reduced the incidence of cancer, AIDS, and other diseases in the areas surrounding them. However, Valerii noted the claims were published without any supporting data, and physicist Edward Kruglyakov, who had previously visited the site and suggested it to me, also found them without any scientific merit. A cordoned-off central area of our pyramid was presently "energizing" some crystal spheres, and we were cautioned that the energy there was so intense that one could lose consciousness. On impulse, I ducked under the rope and stood in that area for a time, while Valerii photographed me, barely containing his amusement. But I felt no effect

whatever. No effect is what we also can suspect of pyramid power applied to water.

Gem-'Informed'

Supposed "information" contained in rocks, minerals, and crystals can—according to some New Age sources (e.g., Gienger and Goebel 2007)—be transferred (in some mystical way) to water. Thus, proponents say, the water has become "infused" with so-called "crystalline energy"—which is not a scientific concept. (Also known as "crystal water," it is distinguished from mineral water, which, as discussed earlier, simply contains traces of minerals.) The "infusions" can be made in various ways—as by soaking, steaming, or boiling, although one is cautioned to beware of the multitude of toxic stones! Alternately, one can insert a test tube with the stone into a container of water or stand a glass of water on a slice of the stone; thus, the stone and water never touch! It is not surprising, therefore, that proponents compare the liquid remedies to homeopathic ones (Gienger and Goebel 2007, 6).

THE SUPPOSEDLY MYSTICAL POWER OF THE PYRAMIDS BECAME AN AMERICAN CRAZE OF THE 1970S AND BEYOND.

The practice derives from the therapeutic effects that allegedly come from applying a "healing" stone to the body or wearing or carrying it as a talisman. For instance, amethyst is said to have (among other things) "a blood-pressure lowering effect." By supposedly transferring the "information" and/or "energy" to water (the stone is not intended to *dissolve* in it), the "remedy" may be utilized more effectively. For example, it can be drunk, used in a compress, generously applied over a larger area, or even bathed in (Gienger and Goebel 2007, 6–10, 18–33, 66).

Claims to the contrary, however, there is no credible scientific evidence for special therapeutic effects of gem water per se—other than as a placebo.

* * *

As these many examples show, water deemed to be in some way "magic" has existed in some form since the most ancient times, and it continues today along with newer forms, including that allegedly imbued with various so-called "energies." As a practical matter, however, we see that—except for certain natural additives such as lithium or various artificially introduced substances—water is basically water. Claims that it is magical are pseudoscientific—indeed, examples of what is called "magical thinking"—and such belief is perpetually trumped in the real world by science. ■

Notes

1. The list of examples in these two categories is not exhaustive.
2. This White Rock bottle's label continued to bear the words quoted, "Lay this bottle on its side," for decades after the crown cork was in use—apparently for historical continuity.

References

Barrett, Stephen, MD. 1998. Magnetize Your Beverages? Available online at https://www.mwa.co.th/downloadprd01/article/eng/magnets.pdf; accessed August 1, 2018.

Brayton, Ed. 2018. CFI Sues CVS for Homeopathy Fraud. Available online at www.patheos.com/blogs/dispatches/2018/07/10/cfi-sues-cvs-for-homeopathy-fraud/; accessed August 16, 2018.

Center for Inquiry. 2019. Walmart Sued for Fraud. May 20. The full text of the complaint against Walmart is on the CFI website at https://centerforinquiry.org/wp-content/uploads/2019/05/CFI-v-Walmart.pdf.

Fields, Liz. 2013. Holy Water May Be Harmful to Your Health, Study Finds. Available online at https://abcnews.go.com/Health/study-holy-water-harmful-health/story?id=20257722; accessed August 16, 2018.

Fountain of Youth. 2018. Available online at https://en.wikipedia.org/wiki/Foutain_of_Youth; accessed August 15, 2018.

Franz Mesmer. 2018. Available online at https://www.sciencedirect.com/topics/nursing-and-health-professions/franz-mesmer; accessed August 1, 2018.

Gienger, Michael, and Joachim Goebel. 2007. *Gem Water: How to Prepare and Use More Than 130 Crystal Waters for Therapeutic Treatments*. Forres, Great Britain: Earthdancer.

Goudeau, Radbond, et al. 2014. *The Imagined and Real Jerusalem in Art and Architecture*. Boston: Brill, 170–183.

Holy water. 2018. Available online at https://en.wikipedia.org/wiki/Holy_water#History; accessed August 16, 2018.

Lyons, Albert S., and R. Joseph Petrucelli. 1978. *Medicine: An Illustrated History*. New York: Harry N. Abrams.

Magic formulary. 2018. Available online at www.thesmartwitch.com/The_Smart_Witch_Formulary.html; accessed August 22, 2018.

Nickell, Joe. 2004. *The Mystery Chronicles*. Lexington: The University Press of Kentucky.

———. 2005. Healing waters. *Skeptical Briefs*. Part I: Spas (September): 5–7; Part II: Miraculous springs (December): 6–7.

———. 2008. Lourdes Medical Bureau rebels. Available online at https://centerforinquiry.org/blog/lourdes_medical_bureau_rebels/; accessed August 14, 2018.

———. 2011. 'Pop' culture: Patent medicines become soda drinks. Skeptical Inquirer 35(1) (January/February).

———. 2016a. Dispelling demons: Detective work at the Conjuring house. Skeptical Inquirer 40(6) (November/December).

———. 2016b. Harmless homeopathy horror? Available online at https://centerforinquiry.org/blog/harmless_homeopathy_horror; accessed August 16, 2018.

Ostrander, Sheila, and Lynn Schroeder. 1970. *Psychic Discoveries Behind the Iron Curtain*. New York: Bantam Books.

Joe Nickell, PhD, is CSI's senior research fellow. He is author, coauthor, or editor of some forty books and is a collector of paranormal and pseudoscience artifacts, some of which are online at skeptiseum.org.

Laser Acupuncture: High-Tech Placebo

Its proponents may have hijacked a high-tech tool, but laser acupuncture has no more scientific validity than acupuncture with needles.

SÉBASTIEN POINT

The laser is one of the technological wonders invented during the past century. It took the genius of Einstein and Kastler, then the competition between many brilliant minds of the time, including Townes, Schawlow, Maiman, and Gould, to emit the first laser beam from a ruby in 1960. Since then, applications have continuously increased in various fields of research, industry, and medicine. But the laser has also been diverted to give a boost to a practice as ancestral as inefficient: acupuncture.

An Advanced Technology

A laser is made of spatially and temporally coherent light radiation, which means that the energy is transported within a single frequency inside a very narrow light beam. Lasers are used in many medical disciplines. Depending on its characteristics and target, a laser beam can cause four types of effects on biological tissues:

- A thermal effect, which exploits the ability of radiation to be absorbed and transformed into heat by biological tissues. This type of effect is used in particular in the treatment of superficial vascular lesions such as angiomas.
- A photochemical effect, exploited in photodynamic therapy, which consists of injecting the patient with a photosensitive substance that easily binds with lipids of cells, which, exposed to the laser, become the place of chemical reactions that cause their destruction. The phenomenon is used to kill cancer cells.
- A mechanical effect, appearing when the intensity of the electric fields of light is sufficient to create locally a microplasma and a shock wave that breaks the biological tissues. This effect is used in urology, for example, to destroy kidney stones.
- A photoablative effect, related to the ability of proteins to absorb ultraviolet radiations and to photo-dissociate. Photoablation is used, for example, in eye surgery to correct the corneal curvature.

These four phenomena alone can explain all the mechanisms involved in a laser intervention on the human body. All … or almost. Information on the internet will tell you that there is a new therapy known as LLLT, or low-level laser therapy. On PubMed, the leading bibliographic search engine in biology and medicine, typing the keyword "LLLT" will give you a list of several thousand research articles dedicated to the behavior of our cells under low laser irradiation and the application that can be made especially for cancer treatment (for example, Robijns et al. 2017) or pain management (for example, Clijsen et al. 2017). Caution is required, however, because these studies are not always very solid. For example, concerning the LLLT treatment of pressure ulcers, a recent analysis of the available data (Machado et al. 2017) considered only four articles out of 386 valid. The effect of low laser irradiation is therefore a subject of clinical research, but the relevance and effectiveness of treatments, or the mechanisms of possible actions, are not firmly scientifically established. Yet it was enough for some to consider the laser as a tool to do everything and seek to include it in the most inefficient pseudo-therapies.

Servicing an Ancestral Therapy

This is the case with laser acupuncture, a special form of acupuncture that uses a laser instead of needles to stimulate acupuncture points, which would be ideal for people afraid of the needles or for when the needles' placement is contraindicated. It would be particularly useful to treat arthritis, carpal tunnel syndrome, eczema, herpes, tinnitus, ear infections, face wrinkles, smoking,

etc. This list of varied indications leaves you puzzled as to the validity of this practice. Supporters of laser acupuncture can assure you that there are some studies proving its effectiveness. For example, an analysis published in the *Journal of Acupuncture and Meridian Studies*, which includes studies of "application of low intensity laser radiation (i.e., non-thermal intensities) to classical meridian points or trigger points" (Baxter et al. 2008), with the aim in particular of identifying the relevant treatment parameters and proposing an improvement of protocols.

Another example is an article from a medical doctor, published in the French journal *Acupuncture & Moxibustion*, which claims to discuss the anti-inflammatory, analgesic, and anti-allergic effects of lasers according to the wavelengths or the amount of energy deposited on acupuncture points (Stephan 2014). It's enough to convince suffering patients that laser acupuncture is a true branch of evidence-based medicine and that its therapeutic validity has been demonstrated, especially because many "healthcare" centers now offer laser acupuncture treatments, encouraging the argument that the treatment has been scientifically demonstrated. The centers highlight numerous testimonials from former patients who, thanks to laser acupuncture, are said to have succeeded in stopping smoking or treating low back pain, neuralgia, or fibromyalgia. For people suffering white coat syndrome, who might be afraid of entering such a "healthcare" center, it is even possible to rent or buy acupuncture lasers, some of which have an "integrated acupuncture finder [that] simply and accurately locates acupuncture points on the skin surface, even for the layperson" (Biolas soft laser for laser acupuncture at praxidienst.com).

The 'Tower of Pisa' Effect

Alas for its supporters, laser acupuncture suffers from a characteristic fault of pseudo-therapies, one I name the "Tower of Pisa" effect: the architecture is flashy, but the foundations are fragile, and the construction will eventually collapse on its own. Laser acupuncture, which seeks to demonstrate its effectiveness through publications in peer-reviewed journals, is based on an outdated assumption: that points exist along meridians through which vital energy flows and that stimulating these points may have a therapeutic effect on the human being. But neither the meridians nor the vital energy have any scientific basis. As Harriet Hall (2016; 2019) and others have pointed out in the Skeptical Inquirer, acupuncture care is a theatricalized placebo effect. Laser acupuncture is only a high-tech version of this therapeutic staging. Therefore, complex technical discussions about, for example, the optimal laser fluence[1] to apply on acupuncture points to provoke some positive health effects only indicate ignorance of how science functions, advancing by confirmation or refutation of testable hypotheses and considering valid only those theories supported by evidence. Never has the evidence demonstrated the anatomical reality of acupuncture points. Therefore, seeking to determine the best ways to stimulate them is like trying to improve the design of chimneys to facilitate the passage of Santa Claus.

Pseudoscience has been a frequent and longtime "hijacker" of new technologies; at the beginning of the twentieth century, the fervor surrounding emerging electrical technologies led to the design of absurd and quirky devices, including purple ray tubes intended to heal asthma or obesity. A century later, it claims to cure anything and everything with laser acupuncture, a more current technology. Although the material has changed, the result remains the same: fictitious, except perhaps for the wallet and ego of some pseudo-caregivers. ■

Note

1. Fluence is the energy deposited by the laser radiation per unit of area.

References

Baxter, G.D., et al. 2008. Clinical effectiveness of laser acupuncture: A systematic review. *Journal of Acupuncture Meridian Studies* 1(2): 65–82.

Clijsen, R., et al. 2017. Effects of low-level laser therapy on pain in patients with musculoskeletal disorders. A systemic review and meta-analysis. *European Journal of Physical Rehabilative Medicine*. doi:10.23736/S1973-9087.17.04432-X.

Hall, H. 2016. Stick it in your ear! How not to do science. Skeptical Inquirer 40(3) (May/June). Available online at https://skepticalinquirer.org/2016/10/stick_it_in_your_ear_how_not_to_do_science/.

———. 2019. Science envy in alternative medicine. Skeptical Inquirer 43(4) (July/August): 21–23.

Machado, R.S., et al. 2017. Low-level laser therapy in the treatment of pressure ulcers: Systematic review. *Lasers in Medical Science*. doi:10.1007/s10103-017-2150-9.

Robijns, et al. 2017. The use of low-level light therapy in supportive care for patients with breast cancer: Review of the literature. *Lasers in Medical Science* 32(1): 229–242.

Stephan, Jean-Marc. 2014. Laser de faible puissance et utilization en acupuncture. *Acupuncture & Moxibustion* 13(2). Available online at www.meridiens.org/acuMoxi/treizedeux/STEPHAN-LASER.pdf.

Sébastien Point is a French engineer and physicist. He is a member of the French skeptics association AFIS and of the quarterly skeptic journal *Science and Pseudosciences*. He has recently been elected as the new president of the non-ionizing radiations section of the French Radiation Protection Society. He previously wrote "The Danger of Chromotherapy" (SI, July/August 2017) and "Free Energy" (SI, January/February 2018). His talks disassembling pseudoscientific practices are available on the internet.

The New Phrenology

Trauma researchers, using modern imaging, have attempted to link psychiatric disorders to child abuse by demonstrating smaller hippocampal volumes. The studies differ little from those of nineteenth-century phrenology.

ROBERT STERN

Phrenology was Franz Gall's (1758–1828) and later Johann Spurzheim's (1776–1832) attempt to correlate behavior with skull shape. Gall published his work between 1810 and 1819 in four volumes, titled *The Anatomy and Physiology of the Nervous System in General and of the Brain in Particular, with Observations on the Possibility of Discovering the Number of Intellectual and Moral Dispositions of Men and Animals Through the Configurations of Their Heads*. Gall's original study found twenty-seven different cranial areas overlying specific and separate brain "organs." By the end of the phrenology vogue in the early twentieth century, the number of "bumps" had risen to forty-two.

Phrenology proved very popular in mid-nineteenth-century America. Both Edgar Allan Poe and Walt Whitman were fervent believers. Poe provided phrenological descriptions of characters in his writings, and Whitman even published the results of his phrenology exams five times. Sarah Josepha Hale, author of *Mary Had a Little Lamb* and the editor of *Godey's Ladies Book* (the most popular women's magazine in America during the mid-nineteenth century), claimed that phrenology was "second only to Christianity as a force for the elevation and improvement of the status of women" (Hothersall 1995). Celebrities such as Clara Barton and Joseph Smith had their heads measured and assessed by phrenologists. President James Garfield was a believer, having had his head examined several times.

Much like today's school counselors, phrenologists acted as life coaches, advising clients on their education and marriages, but based on head bumps rather than SAT scores. The appeal of phrenology in America lay in its emphasis on the detection of moral characteristics via physical characteristics and the belief that intellectual and physical attractiveness could be improved through the exercise of moral and religious living (Lintern 2012). Phrenologists developed and used precise measurements and rating scales. Electricity was eventually introduced into the cities, and phrenologists kept up with the times, investing in the Lavery Electric Phrenometer, patented in 1905 to measure skull bumps "electrically and with scientific precision." (See also Geoffrey Dean, "Phrenology and the Grand Delusion of Experience," Skeptical Inquirer, November/December 2012.)

Today we are living amid a modern phrenology. But instead of assessing moral characteristics, the new phrenology asserts that by demonstrating smaller brain regions—specifically the hippocampus and the amygdala—in patients with psychiatric disorders, it can provide scientific evidence of child abuse. Questions on the rating scales and self-report questionnaires have changed, and MRIs and fMRIs have replaced the scalp calipers and the Lavery Electric Phrenometer, but today's phrenology is little changed from that of over a century ago—it's still reading bumps and correlating them to morality. Only this time the bumps are on the inside of the skull.

The Right Tool for the Job?

MRIs and fMRIs (f is for functional) are astonishing machines. They're big and noisy, and they allow physicians and scientists to look inside a body without cutting into it or using radioactive X-rays. The MRI consists primarily of a giant magnet powerful enough to align

the water molecules in a body. By pulsing on and off and allowing the molecules to alternately fall back into random motion and subsequently realign, computer images can be constructed. Painlessly, and without fear of subsequent radioactive damage to DNA, fMRIs go one step further. They estimate organ function by measuring the blood oxygen being used by cells. Simply put, the MRI measures structure and the fMRI measures function. Both can be enormously helpful in detecting brain anomalies. But as with any tool, it depends upon whether or not it is used appropriately. Attempting to prove a history of child abuse with either tool is GIGO: garbage in, garbage out. Neither machine is capable of imaging patient history, and neither can prove or disprove that child abuse occurred. They can only image size and oxygen use.

Hippocampal Structure and Function

The Hippocampus (Latin for "seahorse") is a structure that looks less like a seahorse than a tadpole in a yoga position with its tail flipped over its head. There are two hippocampi. Each arcs around the middle of the brain in the left and right hemispheres as part of a series of structures known as the limbic system. The limbic system is involved in the creation and regulation of emotions, learning, and memory, and the hippocampus acts primarily, though not exclusively, to process the formation of memories. If the hippocampi are severed, new memories of events are unable to be formed. Older memories, which reside globally in the brain, remain intact.

Chronic stress can affect hippocampal volume. The hippocampus shrinks as its neural connections to other parts of the brain atrophy, and the cells themselves die (Higgins and George 2007, 72). However, by the 1960s it was discovered that the hippocampal cells could regenerate, not only in mice and rats but in other mammals and in humans as well. Several decades and thousands of rodents later, that discovery has held up in replicated studies: the hippocampus regenerates cells in an attempt to return to normal functioning, i.e., the hippocampus responds to its environment.

Those Who Do Not Study Pseudoscience Are Destined to Repeat It

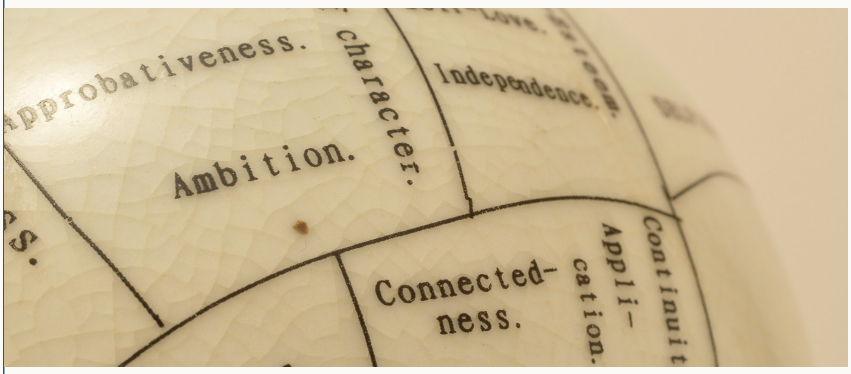
Ever since Freud published *The Aetiology of Hysteria* in 1896, child (sexual) abuse has been assumed to be the etiology for psychiatric disorders. Freud disavowed his theory in 1897, admitting to his friend Wilhelm Fleiss that he exaggerated not only the number of patients he treated for hysteria but also their improvement—none of them improved as a result of his repressed child abuse theory or its practice (Freud 1897).

The term *hysteria* is no longer used; it's considered sexist, although men have been diagnosed with hysteria since the nineteenth century and observed with hysterical behaviors long before then. Instead, hysteria has been subdivided into separate diagnoses based on specific patient behavioral presentations: borderline personality disorder for the erratic, impulsive types; histrionic personality disorder for overly emotional, attention-seeking types; somatization and conversion disorders for those displaying medically unexplainable dysfunctions of the body; dissociative disorders for those displaying medically unexplainable disorders of memory and mind. There are others, and they're all hysteria.

THE NEW PHRENOLOGY ASSERTS THAT BY DEMONSTRATING SMALLER BRAIN REGIONS IN PATIENTS WITH PSYCHIATRIC DISORDERS, IT CAN PROVIDE SCIENTIFIC EVIDENCE OF CHILD ABUSE.

These days, patients who have been diagnosed with any of the post-hysteria diagnoses are often simultaneously diagnosed with post traumatic stress disorder (PTSD). The presumption is that they must have been the victims of child abuse. This is ironic, as it's the very theory that Freud himself discarded over a century ago.

RATHER THAN A *RESULT* OF TRAUMA, SMALLER HIPPOCAMPAL VOLUME MAY IN FACT BE A FACTOR IN THE *CAUSES* OF TRAUMA.



Trauma, PTSD, the Hippocampus, and Some Wrenches

In studies, adults diagnosed with any of the post-hysteria diagnoses who have reported child abuse have undergone MRI imaging, and they have been found to have smaller hippocampal volumes than matched healthy controls. Proof positive? Hardly. Children with documented histories of abuse whose brains have been scanned tend to show no differences or even larger hippocampal volumes than their age- and sex-matched controls (Woon and Hedges 2008; De Bellis et al. 2001).

Throwing another wrench into the abuse/hippocampal volume theory, Mark Gilbertson compared the hippocampal volumes of male Vietnam War vets diagnosed with PTSD to their twin brothers, as well as to a set of healthy controls. The researchers found that the vets exhibited smaller hippocampi than the controls; however, so did their non-combat twins (Gilbertson et al. 2002). In other words, rather than a *result* of trauma, smaller hippocampal volume may in fact be a factor in the *causes* of trauma. These findings have been replicated (van Rooij et al. 2015).

Relying on brain images to diagnose specific mental disorders guarantees problems. First, is the imprecise nature of mental health diagnoses—diagnoses are based on behavioral symptoms. Any diagnosis can exhibit wildly different behaviors; there are no objective physical or laboratory signs. At least, not yet. Schizophrenics can appear depressed but so can unhappy or anxious people. Demented people can appear normal at first but be incapable of stating what year it is, how old they are, where they live, or who they live with when asked. Depressed patients can appear to be demented, psychotic, or intellectually disabled. Delusional people will often come across as perfectly normal until the right "button" is pushed and a string of paranoid rants spews forth.

Second, smaller hippocampal volumes have been found in persons with other psychiatric disorders: schizophrenia, Alzheimer's dementia, major depression, PTSD, borderline personality, antisocial personality, panic disorder, ADHD, autism, and obsessive-compulsive disorder, to name only a few. In addition, hippocampal volume losses are also common in nonpsychiatric disorders: epilepsy, alcoholism, traumatic brain injury, Down syndrome, post-cardiac arrest, Parkinson's disease, congenital adrenal hyperplasia, Turner's syndrome … the list goes on.

Third, and most unfortunately for the child abuse/smaller adult hippocampi proponents, normal adult hippocampal volumes vary from 1,700 cubic mm to 5,680 cubic mm depending on age, sex, genetics, differences in boundary definitions, thickness of the MRI's "sliced" images, etc. (Honeycutt and Smith 1995). Scans of the adults reporting child abuse fall within the range of normal, as do those of the depressed, borderline, PTSD, and even dissociative identity disorder (DID) patients. You'd expect the DID patients to have numerous outgrowths of their hippocampi to manage the memories of all those alter personalities. None has been found.

The Amygdala—Size and Symptoms

Along with smaller hippocampi, smaller amygdalae have often been implicated in the child abuse/adult mental illness studies. The amygdala, an almond-shaped structure sitting at the head of the hippocampus, is involved with fear responses secondary to sensory and cortical input. If the amygdala is damaged, fight or flight responses are hindered or suppressed. Several of the trauma studies found that the borderline patients reporting child abuse often have smaller amygdala volumes, and these studies are cited as more proof that child abuse leaves measurable

damage later in life. However, when imaged with fMRIs the amygdalae of borderline patients were shown to be more—not less—active than the controls (Soloff et al. 2017).

A Rose by Any Other Name

Beliefs rarely die; they evolve. Since the memory wars of the 1980s and 1990s, multiple personality disorder has been renamed DID (dissociative identity disorder) and Freudian repression has become Janetian dissociation, but the belief that child abuse leaves permanent damage has not dissipated. Today, the battle has moved from the television and the courts to professional journals. The once common term *satanic ritual abuse* has been softened and is now called ritual or just organized abuse; however, the purported long-term damages of child abuse have expanded. Child abuse studies now include not only the post-hysteria diagnoses (especially DID), but also schizophrenia, bipolar disorder, ADHD, antisocial personality disorder, eating disorders, and, of course, depression and anxiety. There have also been attempts to change the name of borderline personality disorder to complex-PTSD to emphasize the purported child abuse etiology of the disorder.[1] Though proponents insist that those are separate diagnoses, the symptoms are the same. The extensive overlapping of all the disorders constitutes a diagnostic hash in which one diagnosis cannot be adequately differentiated from another, and two or more disorders are often diagnosed simultaneously. The terms may have changed, but we're still looking at hysteria.

Size Isn't Everything

Can function be inferred from cranial size? Neanderthals led lives that were nasty, brutish, and short—whether due to starvation or the whims of the weather or diseases or savage saber-toothed animals or even those upstart *Homo sapiens*. You might expect smaller hippocampal and amygdala and cortical volumes due to all that abuse. Unfortunately, no known Neanderthal brains have survived; it would be a fascinating study. Their skulls, however, have survived, and those have been measured. Neanderthals had larger brain volumes than we currently do. More than 200 cubic centimeters larger (Us ~ 1,350 cu. cc. Them ~ 1,600 cu. cc).

At the opposite end of the size argument is the disturbing scan of a French "white-collar worker" (Figure 1) whose only complaint to his doctor was "mild left leg weakness." Ninety percent of his brain was squashed flat

BEHAVIORAL ATTRIBUTES AND MORALS AREN'T GENERATED IN SINGLE, SPECIFIC REGIONS OF THE BRAIN. THEY ARE COMPLEX ACTIVITIES THAT REQUIRE EXTENSIVE GLOBAL ACTIVITY.

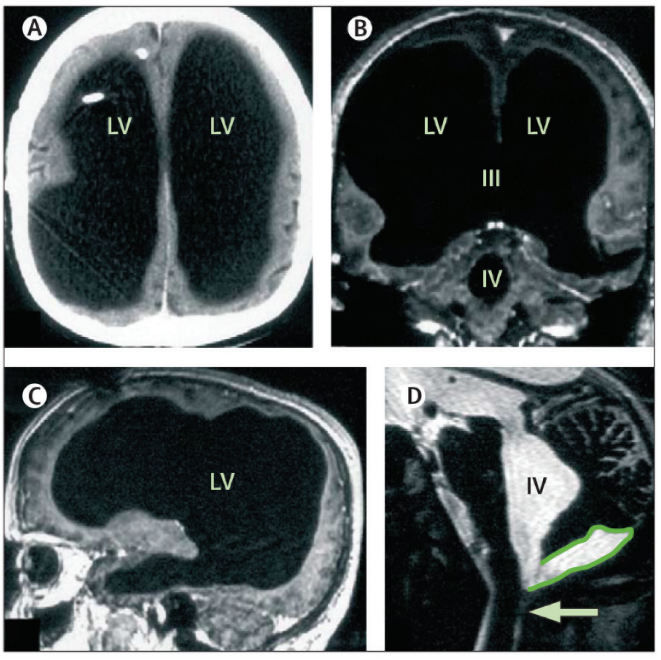


Figure 1: Massive ventricular enlargement, in a patient with normal social functioning

(A) CT; (B, C) T1- weighted MRI, with gadolinium contrast; (D) T2- weighted MRI. LV=lateral ventricle. III=third ventricle. IV=fourth ventricle. Arrow=Magendie's foramen. The posterior fossa cyst is outlined in (D).

Reprinted from The Lancet, *Vol. 370, L. Feuillet et al., Brain of a white collar worker, page 262, copyright 2007, with permission of Elsevier.*

due to hydrocephalus, an abnormality in which cerebral fluid cannot drain out of the brain ventricles and pressure builds up within the skull. Yet the examining doctor found the man to be functioning normally (Feuillet et al. 2007).

Technology Won't Rescue Faulty Thinking

Gall, Spurzheim, and others had theorized that behaviors such as *philoprogenitiveness* and *metaphysical spirit* were generated in specific regions of the brain and that those regions could be assessed via the skull by means of careful measurements. Their theory was wrong. Behavioral attributes and morals aren't generated in single, specific regions of the brain. They are complex activities that require extensive global activity: initiation of thought, memory of the necessary functions, assessment of the sensory inputs, memory of how to produce the motor requirements necessary to complete the acts, judgments regarding the acts, and dozens of other activities. Thinking and behaving is complicated business.

DESPITE THE PICTURE PAINTED BY THE NEW PHRENOLOGISTS, THERE IS MORE TO A PERSON'S LIFE THAN ABUSE.

This is not to dismiss modern research on brain structures and functions—indeed, much important work is being produced. Child abuse and neglect may yet show definitive structural and functional differences shown in properly designed studies. However, most of the current studies that assess child abuse, psychiatric diagnoses, and hippocampal volumes have not been designed to determine *if* there are causal correlations; they were instead designed to show *that* there are causal correlations.

Despite the picture painted by the new phrenologists, there is more to a person's life than abuse. Children grow up; get vaccinated (we hope); get into fights with friends, siblings, and parents; learn to roller skate and fall down; do well or poorly in school and sports; go on dates; go to college; get jobs; lose jobs; get married; have children; get divorced; etc. These are just a very few snapshots in an average life. Yet we know nothing about brain changes brought about by any of these acts. And until we can differentiate any and all of these acts from child abuse in the scans (and currently we cannot), the new phrenology is little better than the old phrenology. ■

Note

1. Genetic studies of borderline twins and their relatives point to heredity as the more important etiology, though numerous environmental factors are involved as well (Distal et al. 2008).

References

De Bellis, M.D., J. Hall, et al. 2001. A pilot longitudinal study of hippocampal volumes in pediatric maltreatment-related posttraumatic stress disorder. *Biological Psychiatry* 50(4)(August 15): 305–309.

Distal, M.A., T.J. Trull, et al. 2008. Heritability of borderline personality disorder features is similar across three countries. *Psychological Medicine* 38(9)(September): 1219–29.

Feuillet, L., H. Dufour, et al. 2007. Brain of a white-collar worker. *The Lancet* 370(9583)(July 21): 262.

Freud, S. 1897. Letter to Wilhelm Fleiss Sept. 21, 1897. In Masson 1985.

Gilbertson, M.W., M.E. Shenton, et al. 2002. Smaller hippocampal volume predicts pathologic vulnerability to psychological trauma. *Nature Neuroscience* 5(11): 1242–1247.

Higgins, E., and M. George. 2007. *The Neuroscience of Clinical Psychiatry*. Philadelphia, PA: Wolters Kluwer/Lippincott Williams & Wilkins, Inc.

Honeycutt, N.A., and C.D. Smith. 1995. Hippocampal volume measurements using magnetic resonance imaging in normal young adults. *Journal of Neuroimaging* April 5(2): 95–100.

Hothersall, D. 1995. *History of Psychology, 3rd edition*. New York: McGraw-Hill, Inc.

Lintern, M. 2012. Phrenology in Victorian America. *The Garfield Observer: The Blog of James A. Garfield Historical Site* (August 31). Available online at https://garfieldnps.wordpress.com/2012/08/31/phrenology-in-victorian-america/.

Masson, J.M. (ed.). 1985. *The Complete Letters of Sigmund Freud to Wilhelm Fliess, 1887–1904*. Cambridge: Harvard University Press. Available online at http://ww3.haverford.edu/psychology/ddavis/ffliess.html.

Soloff, P.H., K. Abraham, et al. 2017. Hyper-modulation of brain networks by the amygdala among women with borderline personality disorder: Network signatures of affective interference during cognitive processing. *Journal of Psychiatric Research* 88(May): 56–63.

Van Rooij, S.J.H., M. Kennis, et al. 2015. Smaller hippocampal volume as a vulnerability factor for the persistence of post-traumatic stress disorder. *Psychological Medicine*. Cambridge University Press. pp1–10. doi:10.1017/S0033291715000707.

Woon, F.L., and D.W. Hedges. 2008. Hippocampal and amygdala volumes in children and adults with childhood maltreatment-related posttraumatic stress disorder: A meta-analysis. *Hippocampus* 18(8):729–36.

Robert Stern is a retired psychiatrist and former director of the Behavioral Health Unit of a municipal hospital in Iowa Falls, Iowa. He wrote "Trauma and Taboo" in our May/June 2018 issue and the research review "Could Multiple Personality Disorder Explain Life, the Universe, and Everything?" in our January/February 2019 issue.

Unskeptical: Indian Scientists' Opinions of Ayurvedic Medicine

Ayurvedic medicine is so deeply imbued into Indian culture that even most scientists in India strongly support it, according to a survey of 1,100 Indian scientists. This mostly exempts it from critical scrutiny.

BARRY A. KOSMIN

Pseudoscience operates in particular social and political environments. The dominant political ideology in India today is *Hindutva* ("Hindu-ness"), which is associated with the conservative and nationalist governing Bharatiya Janata Party (BJP) led by Prime Minister Narendra Modi. The political aspect of this ideology seeks to define Indian culture in terms of Hindu values, and it is highly critical of the socialist and multicultural policies and practices of the former dominant Indian National Congress Party and its Western-educated elite. The principal cultural feature of *Hindutva* is the valorizing of ancient Hindu civilization and traditions, including its early scientific ideas. A key characteristic of this science was and is its integrative quality and its appeal to intuition as opposed to the brash rationalism of modern western science.

The *Hindutva* ideology involves chauvinistic claims about ancient Indian achievements, and this has led to disputes among scientists, particularly at the annual meetings of the Indian Science Congress. The 2019 Congress featured Andhra University Vice Chancellor G. Nageswara Rao, a professor of inorganic chemistry, who claimed that the Kauravas of *Mahabharata*, the Indian mythological epic, were born out of stem cell research and the test tube fertilization process.

In response, the skeptical All India People's Science Network complained about the spread of politically motivated pseudoscience and irrationality.

> The assertions made at the Indian Science Congress by the Prime Minister in 2014 (Ganesha as symbol of plastic surgery), the Minister of Science and Technology Dr. Harsh Vardhan in 2018 (quoting Stephen Hawking as saying mass energy equivalence is from Vedas), and other invited speakers (2015- Anand Bodas: aviation in ancient India; 2016- Pandey: Siva as environmentalist, Sharma: conch-blowing health benefits) are against the spirit of the directive principles of the constitution regarding the need to inculcate scientific temper. Moreover, the stated vision of the Indian Science Congress is "To inculcate scientific temper among the common people." (Talukdar 2019)

In 2006, the Indian Academy of Sciences, Bangalore, issued "A Decadal Vison Document," *Towards Ayurvedic Biology* (Valiathan 2006). The goal of its author was to in-

THE PRINCIPAL CULTURAL FEATURE OF *HINDUTVA* IS THE VALORIZING OF ANCIENT HINDU CIVILIZATION AND TRADITIONS, INCLUDING ITS EARLY SCIENTIFIC IDEAS.

vestigate Ayurveda's potential as a storehouse of new drugs and chemical formulations as well as herbal medicines. A series of such official initiatives and subsequent controversies led to the decision in 2007 by our team from the Institute for the Study of Secularism in Society and Culture (ISSSC) at Trinity College, Connecticut, and from the Center for Inquiry India to undertake the first large-scale survey of the *Worldviews and Opinions of Scientists* in India (Keysar and Kosmin 2008). The participants in the online survey included 1,100 PhD scientists at 130 institutions. One of the key questions posed related to views about Indian government support for Ayurvedic medical schools at many colleges and at two universities since the 1970s: "Do you approve or disapprove of university degree courses in Ayurvedic medicine?" (see Table 1).

ONLY 44 PERCENT OF SCIENTISTS SURVEYED THOUGHT THAT "SCIENTIFIC ORGANIZATIONS SHOULD CONFRONT RELIGIOUS PRACTICES IF THEY CONTRADICT ACCEPTED SCIENTIFIC THEORIES."

Ayurvedic medicine has been practiced for three thousand years and is seeing a global resurgence. It is a large industry today in India and is becoming popular as "alternative medicine" around the world including recognition by the World Health Organization. Ayurveda (as an amalgam of mind-body interaction, alternative medicine, and philosophies and sciences of healing) is a major component of tourism and lends its name to a variety of consumer products, including health foods, tonics, and cosmetics. Ayurveda has an aura of protoscience and a rough empiricism. It envisages a balance between body, mind, spirit, and social well-being. It resembles the ancient Greek idea of balancing humors with some added alchemy and noble elements such as mercury, lead, and arsenic.

The responses to the survey illustrated the uniqueness of Indian society, reflected in the composition of the sample: 83 percent male and 68 percent Hindu. Thus 43 percent were currently vegetarians, 38 percent believed that "God performs miracles," and 24 percent believed "holy people perform miracles." In India, secularism means tolerance for various religions and philosophies, so 75 percent self-identified as secular or somewhat secular. This attitude tends to privilege religion, for only 44 percent thought that "scientific organizations should confront religious practices if they contradict accepted scientific theories."

Regarding scientific views, most of the scientists endorsed the theory of evolution (88 percent "definitely" or "probably"), though Hinduism does not deny evolution. Tolerance and open mindedness are a feature of Indian culture, so 50 percent of the scientists regarded homeopathy as efficacious and 49 percent thought the same about prayer. Ayurvedic degree courses had strong approval rates: 58 percent approved strongly, 32 percent approved somewhat, 3 percent were "unsure," 5 percent disapproved somewhat, and only 3 percent voiced "strong disapproval." This consensus went far beyond the Hindu adherents to include members of the minority religions (10 percent) and nonbelievers. This suggests that Ayurveda is regarded as a national or civilizational practice rather than merely a Hindu religious one.

Views about Ayurvedic medical degrees have to be put in the comparative context of opinions on degree courses

Do you approve or disapprove of university degree courses in Ayurvedic medicine?

Discipline	N	Strongly Approve	Somewhat Approve	Unsure	Somewhat Disapprove	Strongly Disapprove
Life sciences	133	69%	21%	4%	1%	5%
Engineering	369	65%	26%	3%	2%	4%
Behavioral science	121	60%	30%	1%	6%	4%
Chemistry/Earth science	134	54%	36%	2%	6%	2%
Physics/Mathematics	219	47%	41%	5%	3%	4%
Medical/Health science	88	40%	42%	2%	3%	13%

Table 1.

in Vedic astrology, which are more controversial. Vedic astrology has received more criticism from Indian scientists than Ayurveda, including failed court cases. Our sample divided almost in half with 44 percent approving and 44 percent disapproving. Nevertheless, Vedic astrology is pervasive in Hindu culture in the organization of the calendar and holidays and in making major decisions, such as those about marriage, opening a new business, or moving into a new home. Many Hindus believe that heavenly bodies, including the planets, have an influence throughout the life of a human being and these planetary influences are the "fruit of karma."

An obvious question that arises is whether disciplinary training across the STEM fields affect attitudes toward Ayurvedic medical degree courses. We might expect scientists from the medical and health sciences to have more skeptical views than, say, engineers. Table 1 provides the approval and disapproval responses by discipline. This shows that the endorsement of Ayurveda does vary somewhat by discipline, but it is a matter largely of the degree of intensity of support. Strong approval is the majority norm across all the STEM disciplines except for medical and health professionals. But even in this group, there is 82 percent overall approval in contrast to only 16 percent disapproval. Strong disapproval is negligible across all the disciplines, and only one in eight of those in medicine and health care strongly oppose it even though it is a rival system.

The findings from our research suggest that the cultural heritage of India, which valorizes religion and tradition, raises the status of Ayurveda and seems to overwhelm critical thinking and scientific skepticism. There seems also a societal reluctance to show disapproval; instead, the tendency is to favor conformity. A few quotations from the scientists' comments in response to the survey questions may help explain the thinking behind the consensual results presented here.

- "Ayurveda is empirical and not mysticism, hence I have been cured many a time by such medicine in the past."
- "Homeopathy and Ayurveda medicinal methods are scientific ones and these cannot and should not be equated with Numerology or Palmistry."
- "There is nothing wrong in allowing research in modern science (likewise those in astrology, palmistry, homeopathy, ayurveda etc). Rather than wasting time over arguments, courses in all areas should be encouraged. Loss of old practices is equivalent to loss of old species about which ecologists worry."
- "Human beings belong to a different kingdom than mineral, vegetable, and animal kingdoms."
- "Being in a scientific profession does not per se mean one has to believe only in the epistemological nature of things. One may believe in a certain ontology beyond the epistemic gathering of knowledge."

THE CULTURAL HERITAGE OF INDIA, WHICH VALORIZES RELIGION AND TRADITION, RAISES THE STATUS OF AYURVEDA AND SEEMS TO OVERWHELM CRITICAL THINKING AND SCIENTIFIC SKEPTICISM.

The wider significance of these results for the skeptic movement globally is worth considering, particularly because today India is a major educator and exporter of STEM professionals. The country is also a nuclear power with a successful space program. This suggests a degree of compartmentalization and dualism among its scientific community. ■

References

Keysar, Ariela, and Barry A. Kosmin. 2008. *Worldviews and Opinions of Scientists: India 2007–2008*. Hartford, Connecticut: ISSSC, Trinity College.

Talukdar, Sandipan. 2019. Indian Science Congress: A mockery of science! NewsClick (January 7). Available online at https://www.newsclick.in/indian-science-congress-mockery-science.

Valiathan, M.S. 2006. *Towards Ayurvedic Biology*. Bangalore: Indian Academy of Sciences.

Barry A. Kosmin, PhD, is Research Professor of Public Policy and Law and Director, Institute for the Study of Secularism in Society & Culture, Trinity College, Hartford, Connecticut. He is coauthor (with Ariela Keysar) of *Religion in a Free Market*. He is a member of the Center for Inquiry Board of Directors.

Suing for Science

Why the Center for Inquiry chose homeopathy for its first court cases challenging any of the forms of pseudoscience that plague society.

NICHOLAS J. LITTLE

If flipping through the pages of Skeptical Inquirer shows us anything (and it does—the editor made sure I put that in), it is that science is misunderstood, misused, and misrepresented throughout our society. And if the United States is known for anything, it's for a system where if you are wronged, the first reaction is to sue—and sue everyone. So why, I am frequently asked, aren't there more science-based lawsuits and court cases?

In preparation for this article, I asked friends to name famous science lawsuits. And all people came up with was the Scopes Monkey Trial (or, sometimes, the "intelligent design" case of *Kitzmiller v. Dover Area School District*[1]). But often it appears there is a restraining order in force between the law and science.

Here are a few explanations of that and a description of how the Center for Inquiry (CFI), which includes the Committee for Skeptical Inquiry, managed to work its way around that and file not just one but two major lawsuits challenging the method of sale of homeopathic, pseudoscientific nonsense in CVS and Walmart stores in the District of Columbia.

1. It's not actually true; there are plenty of "science" lawsuits.

These tend to be intellectual property cases and rarely make big news, though they can have a large impact on consumers. One of the largest cases I worked on as a for-profit attorney was such a case, regarding patents on the process for attaching covers to golf balls. Had the final outcome of the case been different, one of the top-selling golf balls in the world could have been forced off the market. That's golf, though, which is hardly a life-or-death situation. But in cases throughout the federal court system, the availability and profitability of thousands of product lines are determined in products as diverse as pharmaceuticals, telecommunication devices, genetically modified foodstuffs, and so on.

2. Lawyers aren't scientists.

Sure, there are intellectual property lawyers with undergraduate science degrees, sometimes even postgraduate ones. But coming across a practicing lawyer with significant experience in, and a deep understanding of, any scientific field is rare indeed. And if that is the situation with lawyers, it is even more so with judges. Moreover, the Seventh Amendment to the U.S. Constitution provides that "In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved." Intellectual property cases are such suits. Therefore, in a federal scientific case, a lawyer, often with no scientific background, presents a case to a jury, made up of the general public, in front of a judge, usually also without scientific knowledge. The mangling of science that occurs is almost inevitable and rarely presents good opportunities for public coverage via the media.

3. The expert witness system is flawed.

Because of the above-noted lack of scientific expertise in the courtroom, the role of "explainer" tends to fall to expert witnesses. And while there are many brilliant, lucid, and articulate experts out there, the court system is not set up to ensure only scientific truth reaches a jury. Instead, the adversarial process is used: each side presents its own expert witness or witnesses, and the jury (or judge during the written stages) determines credibility and applies the information provided. While expert witnesses can be ruled as not qualified to testify,[2] this determination is made by judges who tend to grant broad leeway to would-be experts. Scientific testimony is then in the hands of competing paid expert witnesses, with the result that whoever is most persuasive wins out, not who is most scientifically accurate.

4. Suing the government is really tough.
Much of where science would play an important role in non-intellectual property matters falls not to the traditional legal system but instead the realm of government regulations. Exhaust emissions from cars, levels of pollution in water and food, the approval of new medications, and other areas are presided over by executive agencies. And while such determinations by the government are not unchallengeable—and decisions by agencies can be and are the basis of court cases—the court system largely defers to agency interpretations of congressional commands. Even getting in the door of the court is tough; to have your case heard, you must show standing. In other words, you must show that you have sufficient connection to and have suffered sufficient harm from the challenged action. This bar seems to be being constantly raised by the court system, making challenges to government action harder and harder. This, combined with the deference shown by courts to agency decisions, is the product of our separation of powers. The courts feel, largely, that "bad" decisions by government agencies should be rectified by the democratic process, not by unelected judges.

So as we can see, the federal court system is poorly prepared to handle scientific matters, avoids handling them if at all possible, and often handles them pretty badly when it does address them. As a result, we at CFI spent years, frustrated, pondering over how to bring a court case challenging any of the forms of pseudoscience that plague society. We decided early on to focus on homeopathy for multiple reasons. First, homeopathy is a booming business, with billions of dollars spent each year on it in the United States alone. Second, homeopathy is completely laughable in its lack of scientific validity. It's not just that all research shows homeopathy does not have any effect above that of a placebo, the ridiculous notion of massive levels of dilution and the invented excuse of "water memory" upon which homeopathy is based mean that it simply *cannot* have any effect above that of a placebo. Third, homeopathy is widely visible, sold on our pharmacy shelves next to Tylenol and Robitussin, unlike quackery such as Reiki healing and acupuncture, which the recipient must at least make some effort to seek out.

COMING ACROSS A PRACTICING LAWYER WITH SIGNIFICANT EXPERIENCE IN, AND A DEEP UNDERSTANDING OF, ANY SCIENTIFIC FIELD IS RARE.

But we quickly ran into roadblocks. Homeopathy is, to at least an extent, regulated by both the Federal Drug Administration (FDA) and the Federal Trade Commission (FTC). In fact, the FTC has reasonably recently issued guidelines for the labeling of homeopathic over-the-counter products.[3] Unfortunately, they haven't taken any real steps to enforce those guidelines, and, as I've noted, suing a government agency for not doing its job is next to impossible.

The second significant problem was that of standing. CFI, as an organization, hasn't been directly harmed by

homeopathic manufacturers or retailers. Those who are harmed and thus have standing to sue fall into three overlapping groups: those who have taken tainted, potentially harmful homeopathic products; those who have taken homeopathic products and so suffered longer symptoms, or even permanent damage, from not taking real medicine and relying on homeopathic nonsense; and those who have purchased homeopathic products and wasted their money on water and sugar pills.

Those who have taken impure products or who have suffered significant permanent harm, such as children who have been left with hearing loss as a result of reliance on homeopathic eardrops, are hard for an organization such as CFI to locate. While they can sue the manufacturer of the product, they are likely to be represented by plaintiff law firms and are interested largely in a financial payout. For the overwhelming majority of those duped into homeopathy, the harm is longer suffering of a treatable condition and the financial damage of buying worthless products. Not only are most of our members and supporters already aware of homeopathy's bogus standing—and so are unlikely to have purchased such products—CFI has no way of gathering those who have suffered this harm (many of whom still believe in the efficacy of homeopathy) into a plaintiff's class that can gain the attention of a giant manufacturer such as Boiron.

SCIENTIFIC TESTIMONY IS THEN IN THE HANDS OF COMPETING PAID EXPERT WITNESSES, WITH THE RESULT THAT WHOEVER IS MOST PERSUASIVE WINS OUT, NOT WHO IS MOST SCIENTIFICALLY ACCURATE.

This, then, was the dilemma. The government requirements for homeopathy are laughably low, and where the homeopathic manufacturers failed to follow them, the government failed to act. The individual harm to most consumers of homeopathy, even if they could be convinced of the worthlessness of the product they bought, is so low that motivating them to join a lawsuit would be almost impossible. For years, this seemed insurmountable.

Washington, D.C., Consumer Protection law, however, came to the rescue. Under District of Columbia law, consumers have an enforceable right to truthful information about products sold to them. And, most important, court decisions applying that law have made clear that it is not just the consumer that can sue; organizations such as CFI can act on behalf of the general public and bring suit to challenge breaches of this right. While the manufacturers of homeopathy could state that they have printed what the FDA and FTC require on their packaging and so claim some form of safe harbor, the retailers also make claims about the products in how they choose to market and display them. And if these claims are untrue, then they are actionable under the D.C. Consumer Protection statute.

When you walk into a CVS, Walmart, or any other large retailer that has a pharmacy section, you see signs breaking down the aisles by ailments. There is a pain relief section, a cold and flu section, and an allergy relief one. In these stores, homeopathic products are sold in these sections alongside science-based remedies with no distinction. Oscillococcinum, a 10^{400} dilution of the heart and liver of the Muscovy duck that claims to treat "cold and flu symptoms," is displayed next to Nyquil. Arnicare, allegedly containing wolfsbane, sits alongside Advil. Even homeopathic treatments for asthma and children's allergies are displayed next to real medicine for these serious conditions.

BY DISPLAYING HOMEOPATHIC PRODUCTS NEXT TO SCIENCE-BASED REMEDIES, RETAILERS SUCH AS CVS AND WALMART ARE DELIBERATELY BLURRING THE DISTINCTION BETWEEN THE TWO.

CFI's case is simple. By displaying homeopathic products next to science-based remedies, retailers such as CVS and Walmart are deliberately blurring the distinction between the two and trying to imbue the homeopathic products with the reputation for efficacy of the science-based medicines. By placing a homeopathic product under a sign reading "cold and flu," the retailer is making an affirmative claim that this product is a treatment for colds or the flu. Of course, there *are* no homeopathic medicines or remedies. There are no homeopathic products that actually treat cold and flu, relieve pain, or treat teething problems in babies at any level above that of a placebo.

By their placement, both in labeled sections and next to real medicines, retailers such as CVS and Walmart are making affirmative claims about homeopathic products. And those claims are demonstrably false. Every time a consumer buys one of those products, CFI maintains that the store has broken the law. According to the statute, the penalty for each breach is either the amount of the fraud ($26.49 for Oscillococcinum in CVS[4]) or $1,500, whichever is larger.

CFI's suits against CVS and Walmart are different from the typical suits homeopaths have faced. When large class actions have been brought by plaintiff's lawyers, the manufacturers have faced a choice: fight the suit or pay a settlement. CFI did not, however, bring this suit looking for a financial settlement. There is no option for the retailers to simply write a check and continue as before. To settle this suit, the retailers must stop defrauding consumers. Homeopathic products, if they are to be sold, should be clearly displayed as such and not intermingled with real medicine. No consumer should purchase homeopathic products by mistake or having been convinced by the retailer's placement and marketing that they are as effective as real medicine.

Suing to control pseudoscience isn't easy. But CFI has worked out a way we can protect consumers, and we will see just how much retailers are willing to risk to continue to display homeopathic snake oil alongside real medicines. CVS and Walmart pride themselves on being there to help with their customers' health care choices. It's time for them to stop pushing homeopathic nonsense onto those customers. ■

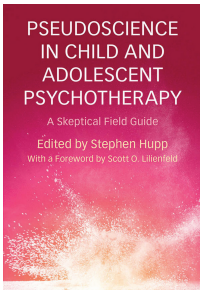
Notes

1. 400 F. Supp. 2d 707 (M.D. Penn. 2005)
2. Federal courts here use the standard as laid out in the Federal Rules of Evidence Rule 702, based on the Supreme Court case *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 578 (1993) and following cases.
3. https://www.ftc.gov/news-events/press-releases/2016/11/ftc-issues-enforcement-policy-statement-regarding-marketing
4. https://www.cvs.com/shop/boiron-oscillococcinum-quick-dissolving-pellets-prodid-706558

Nicholas J. Little is vice president and general counsel of the Center for Inquiry at its executive offices in Washington, D.C.

Countering the Pseudoscience in Psychotherapy for the Young

HARRIET HALL



Pseudoscience in Child and Adolescent Psychotherapy: A Skeptical Field Guide. Edited by Stephen Hupp with a foreword by Scott O. Lilienfeld. Cambridge University Press, 2019. ISBN 978-1-107-17531. 314 pp. Paperback, $26.44.

Pseudoscience in Child and Adolescent Psychotherapy: A Skeptical Field Guide is a new book with multiple authors edited by Stephen Hupp. They point out that "It is difficult to prove that something works, especially in the field of psychotherapy, and particularly in attempting to help children." There is little research on children, and research in adults may not apply to children. This very useful book addresses this neglected field. It does a wonderful job of separating psychotherapeutic treatments that have been scientifically proven to work and therapies that are based on pseudoscience.

Nineteen chapters by skeptical experts address everything from tics to toileting, from depression to anxiety, from sleep to substance abuse. The first chapter is an introduction to critical thinking about psychotherapy, covering pseudoscience and skepticism, plausibility, and good science. Each chapter covers myths, questionable ideas, and treatments that are implausible, ineffective, or harmful. Then it explains which therapies are supported by good scientific research, followed by a succinct conclusion. As a bonus, each chapter features a sidebar by a prominent interdisciplinary science communicator on peripheral subjects such as dolphin-assisted therapy, gay conversion therapy, fear of GMOs, alien abduction, and breatharians. Four of the sidebars were contributed by authors who have also written for *Science-Based Medicine*, and others are by skeptics who have spoken at national conferences, such as Britt Marie Hermes and Sheldon Helms.

As an example, here are some of the implausible, untested treatments they list for anxiety: homeopathy, crystals, thought field therapies, moxibustion, Tappy Bear (a really silly idea that was new to me), acupuncture, and neurofeedback video games, including MindLight.

The book is full of fascinating information and is extensively referenced. Joe Nickell reveals that breatharians have been caught making nighttime forays for junk food. Indre Viskontas debunks the idea that children should be taught based on their preferred learning style; in fact, research has shown that conditions that make learning seem more difficult are actually more effective for long-term retention. Medications for ADHD may be more effective if behavior therapy is implemented first. The Brain Gym program has been widely adopted by schools but is not supported by evidence. Tics are a brain disorder, not a spinal disorder that could be corrected with chiropractic adjustments; nevertheless, some chiropractors try.

Pseudoscience in Child and Adolescent Psychotherapy is full of fascinating information and is extensively referenced.

Treatment of psychosis has evolved from "maintenance" to "recovery" with coordinated specialty care programs that have been proven effective in randomized controlled trials. The evidence for cognitive behavioral therapy is good but not perfect; scientific conclusions are provisional and subject to revision as new data comes in.

Phobias describe behavior but don't explain it: Sally runs away when she sees a dog because she has a phobia. But that's circular reasoning. Why does she behave that way?

The book also discusses pitfalls in research; if you add a placebo to cognitive behavioral therapy (CBT), the results will seem to improve, but that doesn't mean the placebo is an effective treatment. Tolerating pseudoscientific treatments degrades the profession; failing to act is condoning fraud. One of the reasons pseudoscientific practices pro-

liferate is that evidence-based practices are underutilized.

Obsessive compulsive disorder (OCD) involves rituals, and rituals can have psychological benefits even if they are not based in reality. In Heart Centered Hypnotherapy, therapists use past-life regression to "wash off the child" that was dirtied, which supposedly cures OCD. When a pseudoscientific treatment fails to work, proponents often come up with ad hoc hypotheses. The American psychologist Roger Callahan developed a pseudoscientific therapy he calls "thought field therapy," using fingers to tap on various spots on the body. He explained his failures by positing "individual energy toxins," which could be any substance consumed or inhaled, including common foods. He made patients severely restrict their diets for no good reason.

Some attachment therapists claim that emotional attachment of infant to mother occurs prenatally as a result of telepathic communication that begins at the time of conception. Apparently, positive research exists for eye movement desensitization and reprocessing (EMDR)—but only because the research methods were flawed and because factors such as patient engagement are common to *all* successful psychotherapies.

Eating behavior responds to reinforcement, but studies have shown that rewards for eating are counterproductive. Crib bumpers were designed to prevent infants from getting heads or limbs stuck between the slats are no longer needed because safety regulations have changed the size of crib slats. But they are still being sold and have been implicated in several infant deaths.

Lying is not always a sign of psychological problems; social skills in adolescents improve when they become more effective liars. Lying in moderation could be considered a sign of psychological health.

Research has shown that venting anger, Scared Straight programs, the anti-drug DARE program, and Boot Camps are harmful.

The last chapter says, "The mind is a terrible thing—there are so many ways that our minds can be deceived. … Reading through these chapters, it's really exhausting to think how much time, money, and effort are spent using therapy practices that are questionable, ineffective, or even harmful."

When the book calls an idea "questionable" that leaves the door open for some of these practices to develop an evidence base. One pessimistic writer deplores Counter-Enlightenment trends in the United States that lead people to reject or deny scientific findings: "If indeed a general anti-rationalist posture is responsible for pseudoscientific thinking about children's mental health, it is difficult to see how the public can be convinced of the need for evidence-based treatments."

There is an incredible amount of silliness out there, but it's reassuring to see how many writers Hupp found who understand science and can cogently critique pseudoscience in this book. There is reason to hope that good science will prevail and that this book will be instrumental in making progress. This book would be instructive for psychotherapists, and it is an invaluable resource for parents who are trying to find an effective psychotherapy for their children and adolescents. They need all the help they can get. ■

This article was originally published on the *Science-Based Medicine* blog.

Harriet Hall, MD, is a contributing editor and columnist for the Skeptical Inquirer. She is a weekly contributor to the *Science-Based Medicine* blog and is one of its editors. She has also contributed to Quackwatch and to several other respected journals and publications. She is the author of *Women Aren't Supposed to Fly: The Memoirs of a Female Flight Surgeon* and coauthor of the textbook *Consumer Health: A Guide to Intelligent Decisions*.

Chernobyl and the Future of Nuclear Energy

DAVID MORRISON

Chernobyl. Created and written by Craig Manzin. Directed by Johan Renck. HBO and Sky Atlantic. 2019. 5 hours, 30 minutes in five parts.

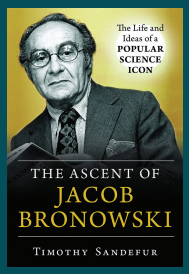
The 1986 explosion of the Number 4 unit of the nuclear power station at Chernobyl, Ukraine, was the worst nuclear accident in history. The accident and the costs of responding to it are credited with a major role in the collapse of the Soviet Union three years later. This accident is relevant to decisions made today about the role of nuclear power in a low-carbon energy strategy. It is therefore timely that HBO has produced an excellent five-part dramatic miniseries simply titled *Chernobyl*. On July 16, *Chernobyl* received nineteen Emmy award nominations.

The HBO series does an outstanding job of presenting the technical and human issues of the accident. Only at the end of the last segment is there the sort of summary one might expect in a documentary. Instead, this production is a scripted drama, depending on the characters and events themselves to carry the message. It focuses on three individuals: academician Valery Legasov, the scientist who best understood the frightening implications of the re-

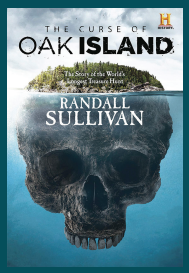
[NEW AND NOTABLE

Listing does not preclude future review.

APOCALYPSE ANY DAY NOW: Deep Underground with America's Doomsday Preppers. Tea Krulos. Journalist Tea Krulos has made a curious and enlightening career out of examining groups of people with odd beliefs. In *Heroes in the Night: Inside the Real Life Superhero Movement*, he interviewed and spent time with ordinary people who dress up as superheroes—not actors or cosplayers but people who actually go out on the streets as servants of justice, (presumably) protecting citizens and preventing crimes. His second book, *Monster Hunters: On the Trail with Ghost Hunters, Bigfooters, Ufologists, and Other Paranormal Investigators*, did much the same with the "unexplained mystery" crowd. Now Krulos returns with another equally relevant and interesting look at the world of American survivalism, doomsday cults, religious prophets, and the like. The tone is more breezy than scholarly (with more than a few references to zombie apocalypses, for example) but the book offers insight into the mentality of conspiracy theorists and doomsday prophets. Chicago Review Press, 2019, 236 pp., $16.99.



THE ASCENT OF JACOB BRONOWSKI: The Life and Ideas of a Popular Science Icon. Timothy Sandefur. Before Carl Sagan and *Cosmos*, there was J. Bronowski and *The Ascent of Man*, the popular 1970s public television series (and book) that elevated scientific thought and discovery to the same iconic status among intellectuals as art and the humanities. Scientist, mathematician, philosopher, historian, humanist, author (*Science and Human Values*, *The Visionary Eye*, *The Origins of Knowledge and Imagination*, *The Face of Violence*), Bronowski was a polymath who sought to unify science and the humanities and show their commonalities in human culture. He was also an extraordinarily effective communicator, totally at home in the medium of television. Sandefur's welcome and appreciative biography covers all facets of Bronowski's extraordinary life and career. Prometheus Books, 2019, 384 pp., $25.



THE CURSE OF OAK ISLAND: The Story of the World's Longest Treasure Hunt. Randall Sullivan. Sullivan, a journalist and former cohost (with former *Point of Inquiry* podcast cohost Indre Viskontas) of the Oprah network show *Miracle Detectives*, turns his not-always-skeptical attention to the venerable "lost treasure" story of Oak Island. The book is a tie-in with the popular History Channel show of the same name; the network's logo appears in the top right hand corner of the cover. SKEPTICAL INQUIRER and CSI's own Joe Nickell are, in a way, credited with inspiring the book; Sullivan writes that Joe ("perhaps the best-known naysayer in the country") had written an article "that attempted to debunk certain myths" about the infamous money pit. Sullivan traces the history of attempts to find the treasure and discusses many of the theories behind the mystery, though the book's lack of references, bibliography—or even an index—is curious and (to skeptics and scholars) potentially problematic. Grove Atlantic, 2018, 410 pp., $27.

DISENTANGLED: Ethnozoology and Environmental Explanation of the Gloucester Sea Serpent. Robert L. France. The author, renowned as an aquatic biologist and ethnozoologist (Dalhousie University), investi-

actor explosion; Boris Shcherbina, deputy chairman of the USSR Council of Ministers, who led the response to the disaster; and a composite character representing the input of other scientists.

The story is confined to the first two years, which saw a massive mobilization of effort across the USSR to contain and remediate the damage. The film skillfully uses dialog to inform the audience on technical issues, such as the explanations by Legasov to Shcherbina of how a nuclear reactor works and to Gorbachev on the dangers of radiation. The testimony at the trial of plant managers for dereliction of duty is also informative, creating a gripping narrative.

The film skillfully uses dialog to inform the audience on technical issues.

I was struck by the attention to accuracy in the film. I have visited (as a tourist) both the Chernobyl plant and the nearby "science city" of Pripyat where 50,000 plant employees worked, and I was initially amazed at the authenticity of the images. Only part way through the series did I learn that the USSR had adopted a standard model for the architecture of such new cities and that several had been built within the USSR that followed this design. The filmmakers used a nuclear plant in Lithuania and its associated "science city" as stand-ins for Chernobyl and Pripyat.

The film makes excellent use of dramatic vignettes to advance the story. In addition to following the fate of first responders, many of whom died from acute radiation sickness, we see short segments on the men who volunteered for a suicide mission to drain radioactive water from the reactor; coal miners recruited to tunnel underneath the burning reactor; military draftees who cleared radioactive debris from the adjacent building, receiving a lifetime near-lethal radiation dose in just

ninety seconds; hunters assigned to kill the surviving dogs from Pripyat; and efforts to convince a ninety-year-old woman to leave her farm when the "exclusion zone" around the nuclear plant was established.

This is a story of heroism and stupidity, of the consequence of a bad initial design for the reactor, and of overcoming efforts within the government to cover up the magnitude of the disaster. Both Legasov and Shcherbina are faced with the herculean task of responding, and ultimately a substantial fraction of the human and material resources of the USSR were committed to the task. As a government scientist myself, I especially appreciated the way individuals from very different backgrounds (party boss, military, and scientists) learned quickly to work together to deal with this unprecedented threat.

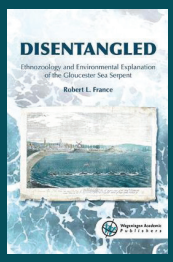
This is a story of heroism and stupidity, of the consequence of a bad initial design for the reactor, and of overcoming efforts within the government to cover up the magnitude of the disaster.

The series does not answer fundamental questions about the consequences of exposure to moderate radiation levels, and there was never an adequate follow-up to determine the effects on the millions, including the population of Kyiv, who were exposed. That issue remains a point of contention as we consider the role of nuclear energy in a carbon-free world.

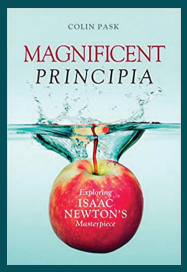
The Soviet RBMK reactors were the primary civil nuclear energy source for the USSR. They were rushed into production and assumed to be entirely safe, a reactor design that could not fail. Therefore, the government saved money by having no containment such as was used elsewhere in the world. It was their faith in the safety of the RBMK that caused initial disbelief that the reactor had exploded and consequent delay in evacuating Pripyat and its 50,000 inhabitants, as dramatized in the film.

To learn more, two excellent recent books on the Chernobyl events provided background for the HBO film: *Midnight at Chernobyl* by Adam Higginbotham and *Chernobyl, the History of the Nuclear Catastrophe* by Serhii Plokhi. ■

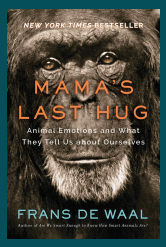
David Morrison is a NASA space scientist, a CSI fellow, and a SKEPTICAL INQUIRER contributing editor.



gates the history and examines the evidence for The Gloucester Sea Serpent, which frequented the coast of New England during the early nineteenth century and was witnessed by many hundreds of people. In this scholarly book published by a serious Dutch academic publisher, France (who objects to the "pseudoscience" of modern cryptozoology) finds what he considers to be "the most parsimonious explanation" for the Gloucester sightings. He says it is early evidence for what is today recognized as being a severe threat to marine biodiversity: entanglement, in this case a large but normal marine animal (he believes it was a most likely a Bluefin tuna) entangled in fishing gear and other maritime debris. If so, the Gloucester sighting suggests that entanglement has a much longer environmental history than previously believed. Wageningen Academic Publishers, 2019, 289 pp., $77.



MAGNIFICENT PRINCIPIA: Exploring Isaac Newton's Masterpiece. Colin Pask. With a new preface by the author. Newton's *Principia* is "the first major book on science as we know it today" and deserves ranking alongside Homer, Shakespeare, and Dickens as treasures of our civilization, says author Pask (University of New South Wales). He says his aim in this book, now in this paperback edition, is simple: He takes the third and final edition of Newton's *Principia*, explains how it sets out Newton's (and now our) approach to science, how the framework for classical mechanics is established, how terrestrial phenomena such as tides and projectile motion are explained, and how we can understand the dynamics of the solar system and the paths of comets. The discerning reader may, like Pask, end up marveling at "how any one man could have taken such a leap forward and produced such innovative and groundbreaking work." Prometheus Books, 2019, 526 pp., $18.



MAMA'S LAST HUG: Animal Emotions and What They Tell Us about Ourselves. Frans de Waal. In four decades of animal research and a series of provocative recent books, Frans de Waal has been tearing down the barriers we've constructed to separate us from our animal cousins. His most recent previous book described animal intelligence; this one examines animal emotions, from primates on down. When you are through with it, you'll never again think humans have a unique position in this arena. He shows that emotions are everywhere in the animal kingdom, from fish to birds to insects and even in brainy mollusk such as the octopus. Emotions structure our own societies to a degree we rarely acknowledge, says de Waal, and he would be hard-pressed to pinpoint any "uniquely human" emotions. As a result, "We had better pay careful attention to the emotional background we share with our fellow travelers on this planet." W.W. Norton, 2019, 326 pp., $27.95.

PLEASED TO MEET ME: How Genes, Germs, and the Environment Make Us Who We Are. Bill Sullivan. A microbiologist and geneticist (Indiana University School of Medicine) who writes in a lively, inviting style, Sullivan takes us on a readable quest to show how our genes and our biome shape our behavior. Or, more properly, how our actions and personalities arise "from a dizzying interplay between genes, microbes, hormones, neurotransmitters, and our environment." Chapters deal with such specifics as our taste, appetite, addictions, moods, demons, mind, beliefs, and future. National Geographic Books, 2019, 336 pp., $26.

—Kendrick Frazier and Benjamin Radford

Skeptical Inquirer
HEREDITY & YOUR DNA
Seven Big Misconceptions
Bussi's E-Cat: Exposing a Claimed Cold Fusion Device
Dragon Hoaxes: Piltdown Men of Creationism
Creationist Funhouse: The Red Shift

DNA Misconceptions

Carl Zimmer's article "Seven Big Misconceptions about Heredity" (May/June 2019) makes some excellent points, and I would like to amplify a bit on "Misconception 1: Finding a Special Ancestor Makes You Special." Using the generally accepted rule of thumb that there are three generations per century, it is possible to estimate how many ancestors a person has at a certain historical time. Because we all have two biological parents, the number of ancestors is simply two taken to the power given by the number of generations. For example, two hundred years ago would be six generations back, and the number of ancestors would be two to the sixth power, or sixty-four.

What is hard for many people to grasp is how quickly this exponential function grows. At some point the number of "ancestors" exceeds the population of the earth, and that point is not all that long ago. When the number of ancestors gets large, we must stop talking about unique "ancestors" and instead discuss "ancestor paths," any number of which can lead to the same individual. We should think of an intertwined family mesh instead of a family tree. Using estimates of the world population, I find the approximate date at which the number of ancestor paths equals the world population to be around an astonishingly recent 1050 BCE! At this point the population of the planet and the number of ancestor paths are both about 600 million.

Going back two thousand years, or sixty generations, we learn that on average each of us has about three billion paths to any person living at that time! This shoots down the so-called "Merovingian Line" in Dan Brown's thriller *The DaVinci Code* and shows that we are indeed biologically one human family.

Thomas Meyer
Ames, Iowa

Too Many Medical Tests?

In "Too Many Medical Tests" (May/June 2019), Dr. Harriet Hall makes broad claims that do not have an evidence base about how doctors think in dichotomous terms, e.g., "Doctors tend to think of tests as giving consistent and reliable yes or no answers." Medical training emphasizes interpretation of quantifiable data, if available, as one data point in an assessment of one problem in a patient.

"Test results are consistent and reliable" is not a myth. Our pathology colleagues are held to high standards to report "consistent and reliable" measurements. There are error bars associated with laboratory results. Anecdotes about errors or min r variations in results do not discredit our reliance on lab data to make decisions about patient care. Clinical judgment is crucial in deciding when to repeat a test before acting on the results.

The "Rules of Thumb for Patients" are simplistic and not practical for most clinical encounters. Context matters. Never say "never." "Understand the reason for the test" sounds good. For routine tests, most patients choose to trust the professional assessment of the doctor that doing the test is appropriate. When greater-than-minimal risk is associated with performing a test, best practice incorporates shared decision-making before ordering the test. Of course, patients should "Refuse tests that are not indicated." In reality, this applies to a small minority of the tests done every day. The problem is knowing enough medicine to evaluate whether "indications" are present.

David Lehman, MD, PhD
Associate Professor (ret.)
University of Colorado
School of Medicine
Aurora, Colorado

Harriet Hall's article "Too Many Medical Tests" is one I generally agree with, having worked with primary care development over thirty-three years. However, under her heading of Routine Physicals, she states, "But the physical exam itself can be omitted. It's not useful to look in every asymptomatic patient's ears, listen to his or her lungs and heart, or palpate his or her abdomen. What *is* useful is a directed physical exam to address any symptoms."

Upon reading this I was shocked into the realization that this author is all about data at the expense of the person, which can be actually dangerous. I know this from direct experience with my wife's situation, which serves as a perfect example countering Dr. Hall's assertion.

My wife's primary care annual physical checkup proved to be extremely fortuitous. A stethoscope examination of her heart, wherein the doctor noticed something that seemed odd and subtle, got an immediate referral to cardiology. Her aortic valve was ready to fail, and open-heart surgery was required within three months. Without her physician's simple few moments of listening, she would have had a severe heart attack or died. Here is the kicker: she was a *totally* asymptomatic patient!

Such misleading statements as that of Dr. Hall can be generalized into inaction by some people (especially those hesitant or opposed to medical visits) with potentially disastrous results.

Darryl Wally
Pittsboro, North Carolina

Harriet Hall replies:

Dr. Lehman correctly points out that quality control holds tests to high standards and that medical training emphasizes judicious interpretation of lab tests. That does not negate the points I made. He says my claims do not have an evidence base, but much has been published on cognitive errors, overdiagnosis, overconfidence in test results, and harm from pursuing incidentalomas. And I have the evidence of my own observations during seventy-four years of experience as a patient and doctor: I have repeatedly seen simplistic thinking, needless tests, and over-reliance on lab tests—and have been guilty of them myself despite my knowledge. Patients may not know enough to question their doctors' judgment, but they can always ask the doctor if the results of a test will change the management or outcome of their illness and can refuse those that won't.

Darryl Wally offers one anecdote about heart valve disease detected during a routine physical in an asymptomatic patient. But heart valve disease commonly causes symptoms before it requires surgery, and auscultation with a stethoscope is not recommended as a screening test by the U.S. Preventive Services Task Force. It is very rare for a life-threatening problem to be detected by physical exam alone in an asymptomatic patient. Studies have shown that routine physicals do not save lives or prevent disease. Many experts, including the Choosing Wisely campaign, have called for routine physicals to be replaced by health maintenance visits with directed physical exams only to address any symptoms.

Creationist Funhouse: Red Shift

Regarding "Creationist Funhouse, Episode One: The Red Shift" (May/June 2019): Unfortunately, believers in the scientifically ridiculous may be influential in many governments.

The real difficulty for intelligent religious believers is the extreme age of the universe (not quite fourteen billion years) and its incredible size. World religions describe Creation as being *for* hu-

manity! Our triviality is hard to accept.

A mere two thousand years ago a man, who indeed said many good and wise things, has today many millions of believers in his being the actual physical son of the creator of the universe now sitting at his right hand.

No one with a mere human brain capacity could possibly comprehend an omniscient god: no pope, priest, rabbi, imam … or professor! Many people need certainty, and when evidence is not present, then there will be no shortage of those proclaiming the Truth to satisfy them.

Neil McKelvie
Emeritus professor, organic chemistry, CCNY/CUNY
Forest Hills, New York

While I enjoyed Stanley Rice's article on how creationists try to explain away galactic red shifts and apparent galactic distances as some kind of a divine hoax, I must take exception to some statements he made. While Henrietta Leavitt and Edwin Hubble both made great contributions to our understanding of a vast, expanding universe many billions of years old, they were never "collaborators," as Rice stated. Leavitt was one of the many women "computers" at the Harvard Observatory working with glass plates showing stellar images and spectra. Her contributions were made before WWI. Hubble was an astronomer at Mount Wilson and began his career in the early 1920s as Leavitt's was ending with her death on the other side of the country. The two never met, let alone collaborated.

Leavitt discovered the period-luminosity relationship for Cepheid variables but never established an actual distance to a Cepheid or confirmed that there were other galaxies outside of the Milky Way. As for Hubble, he never fully embraced the notion that the red shifts he discovered, which increased in direct proportion to distance, were caused by the expansion of the cosmos due to the big bang. Other astronomers, such as George Gamow and Georges Lemaitre, were the ones who truly understood what those red shifts revealed.

Dennis Middlebrooks
Brooklyn, New York

"Creationist Funhouse, Episode One" by Stanley Rice contains several errors in its description of the science of the expanding universe and the historical background of its discovery. Rice states that Cepheid variable stars in the Milky Way galaxy "all have the same light intensity." This is entirely wrong and gives readers an incorrect understanding of how Cepheids are used to measure distances. In Rice's telling, Edwin Hubble and Henrietta Leavitt were collaborators in the discovery of the age of the universe. This conflates and confuses their separate and independent contributions to astronomy. Leavitt's discovery of the Cepheid period-luminosity relationship was a major influence on Hubble's research, but Hubble's work on variable stars in M31 and other galaxies was done after Leavitt's death. Credit should also be given to Georges Lemaitre, who deduced the universe's expansion prior to Hubble. Rice further distorts the history by stating that "Hubble and Leavitt detected red shifts in the light coming from all of the distant galaxies." Leavitt didn't work on measurements of galaxy red shifts, while Hubble's work on the expansion of the universe used red-shift measurements that were done by other astronomers.

Aaron Barth
Dept. of Physics and Astronomy
University of California, Irvine
Irvine, California

Stanley Rice replies:

In praising both Hubble and Leavitt, I was trying to avoid the brilliant-white-man bias in science history, one that is easy to fall into. While Hubble and Leavitt were not technically collaborators, they both made important contributions. I had to leave out a lot of astronomical history, such as the story of Lemaitre, to keep my article short. I try to be careful outside my area of training (biology), but the error about Cepheid variables was my own misunderstanding.

Gibberish about Water

One of the things I particularly admire in your publication is frequent exposure of so many false and/or misleading statements concerning methods and equipment supposedly in medicine. One such piece of equipment and accompanying unscientific, gibberish advertising is the John Ellis Water Machine.

One of the fantastic claims for what amounts to just a very over-priced still is that it changes the bond angle of water molecules. Any second-year chemistry student can tell you correctly that such a claim is false, but it gets worse. The claimed change is, according to advertising, one of the things responsible for its marvelous curative power, up to and including cancer.

Other claims include "erasing the memory" of previously tainted water, "energizing" the water by increasing the number of electrons in it, and adding oxygen to the water. The last of those claims might be correct but only if, as not specified in the advertising, the oxygen is dissolved in the distilled water by aeration. The first two claims, however, are deliberate lies or clear indications of a complete lack of knowledge of chemistry and physics. Water has no memory, a water molecule cannot have an arbitrary number of electrons, and chemically adding oxygen to water makes it hydrogen peroxide.

I hope some future issue of your fine publication will address this patent fraud.

Tim Lane
San Antonio, Texas

Joe Nickell's "Magic Waters," in this issue, addresses many related pseudoscientific claims and supernatural beliefs about water. —Editor

History Channel's Bad History

Robert Sheaffer writes that the History Channel "once actually showed history" ("The History Channel Mangles Project Blue Book," May/June 2019). Yes, and they were really bad at it. Here are some howlers I remember from those days (in the 1990s, I think). These were mistakes, not deliberate counterfactuals. But getting historical facts wildly wrong is not okay when "History" is literally your middle name.

*The battle of Gettysburg happened in July 1861. No, it was 1863.

*The first attempted launch of an American satellite (Vanguard) was in November 1956 (almost a year before Sputnik!). It was really in 1957 (first success in 1958).

*The first A-bomb test, in New Mexico, was in February 1945. No, it was July. No one at the History Channel considered how WWII might have gone differently if we had had the bomb when FDR was President and we were still fighting in Europe.

Jogn Fortier
White Bear Lake, Minnesota

Flat Earth?

If Marilyn Teed is convinced that the earth is flat, then she has not been taught science ("Flat Earth School Board Presentation Intelligently Designed," by Craig Foster, May/June 2019). Science is about putting facts together in a coherent manner, and it is not just a collection of assertions.

The angles need not be the same, but if an object is above a plane it is visible everywhere on the plane, and if it is below the plane it is invisible. Sunrise and sunset must occur at the same time everywhere on the plane. The north star and the southern cross should be visible to everyone.

You may not live in a place where the curvature of the earth

can be seen, but if you think enough about the implications of living on a plane, it becomes obvious that it is not a tenable hypothesis.

Robert Clear
Berkeley, California

So as Not to Define

Stuart Vyse ("National Down Syndrome Society Promotes Communication Pseudoscience," May/June 2019) states that the social movement urged professionals to say "person with autism" (as opposed to "autistic") so as not to define a person by their diagnosis. There were other conditions and diseases at the time that also changed from diagnoses, such as persons with diabetes and persons with epilepsy from *diabetics* and *epileptics*, although some persons with these conditions and diseases still refer themselves as the latter.

Frank Archer
Delta, British Columbia
Canada

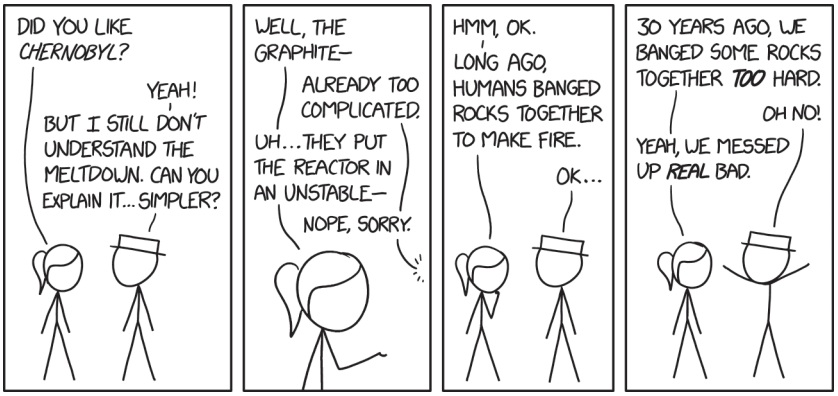
[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words.** Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@skepticalinquirer.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

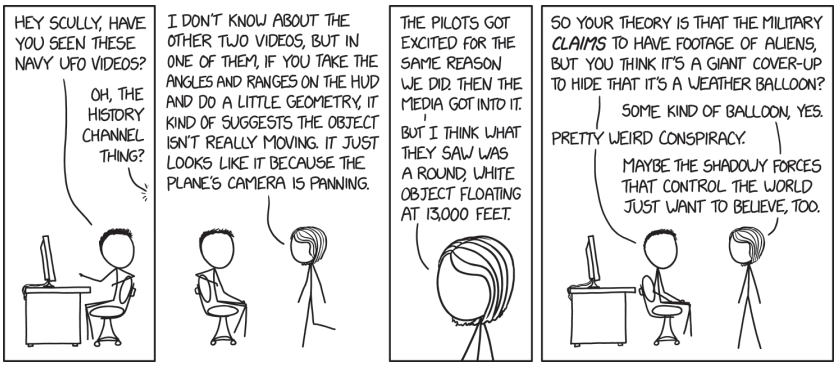
[THE LAST LAUGH BENJAMIN RADFORD

XKCD xkcd.com

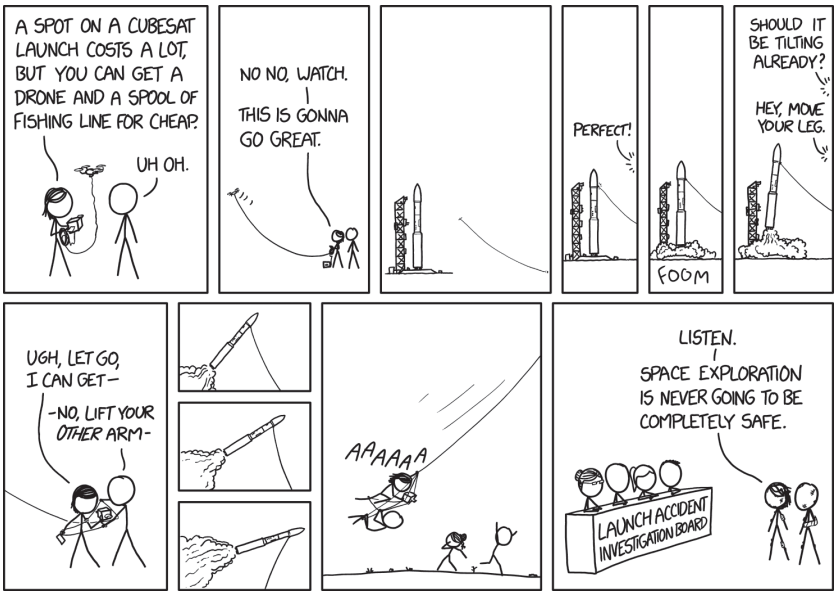
Chernobyl


DID YOU LIKE CHERNOBYL?
YEAH! BUT I STILL DON'T UNDERSTAND THE MELTDOWN. CAN YOU EXPLAIN IT... SIMPLER?
WELL, THE GRAPHITE—
ALREADY TOO COMPLICATED.
UH...THEY PUT THE REACTOR IN AN UNSTABLE—
NOPE, SORRY.
HMM, OK.
LONG AGO, HUMANS BANGED ROCKS TOGETHER TO MAKE FIRE.
OK...
30 YEARS AGO, WE BANGED SOME ROCKS TOGETHER TOO HARD.
OH NO!
YEAH, WE MESSED UP REAL BAD.

UFO


HEY SCULLY, HAVE YOU SEEN THESE NAVY UFO VIDEOS?
OH, THE HISTORY CHANNEL THING?
I DON'T KNOW ABOUT THE OTHER TWO VIDEOS, BUT IN ONE OF THEM, IF YOU TAKE THE ANGLES AND RANGES ON THE HUD AND DO A LITTLE GEOMETRY, IT KIND OF SUGGESTS THE OBJECT ISN'T REALLY MOVING. IT JUST LOOKS LIKE IT BECAUSE THE PLANE'S CAMERA IS PANNING.
THE PILOTS GOT EXCITED FOR THE SAME REASON WE DID. THEN THE MEDIA GOT INTO IT.
BUT I THINK WHAT THEY SAW WAS A ROUND, WHITE OBJECT FLOATING AT 13,000 FEET.
SO YOUR THEORY IS THAT THE MILITARY CLAIMS TO HAVE FOOTAGE OF ALIENS, BUT YOU THINK IT'S A GIANT COVER-UP TO HIDE THAT IT'S A WEATHER BALLOON?
SOME KIND OF BALLOON, YES.
PRETTY WEIRD CONSPIRACY.
MAYBE THE SHADOWY FORCES THAT CONTROL THE WORLD JUST WANT TO BELIEVE, TOO.

Cubesat Launch


A SPOT ON A CUBESAT LAUNCH COSTS A LOT, BUT YOU CAN GET A DRONE AND A SPOOL OF FISHING LINE FOR CHEAP.
UH OH.
NO NO, WATCH. THIS IS GONNA GO GREAT.
PERFECT!
FOOM
SHOULD IT BE TILTING ALREADY?
HEY, MOVE YOUR LEG.
UGH, LET GO, I CAN GET—
-NO, LIFT YOUR OTHER ARM-
AAAAAA
LISTEN. SPACE EXPLORATION IS NEVER GOING TO BE COMPLETELY SAFE.
LAUNCH ACCIDENT INVESTIGATION BOARD

Committee for Skeptical Inquiry

Scientific and Technical Consultants

Gary Bauslaugh,
writer and editor,
Victoria, B.C., Canada

Richard E. Berendzen,
astronomer, Washington, DC

Martin Bridgstock,
senior lecturer, School of Science,
Griffith Univ., Brisbane, Australia

Richard Busch,
magician/mentalist, Pittsburgh, PA

Shawn Carlson,
Society for Amateur Scientists,
East Greenwich, RI

Roger B. Culver,
prof. of astronomy, Colorado State Univ.

Felix Ares de Blas,
prof. of computer science,
Univ. of Basque, San Sebastian, Spain

Nahum J. Duker,
assistant prof. of pathology,
Temple Univ.

Taner Edis,
Division of Science/Physics
Truman State Univ.

Barbara Eisenstadt,
psychologist, educator, clinician,
East Greenbush, NY

William Evans,
prof. of journalism and
creative media, Univ. of Alabama

Bryan Farha,
prof. of behavioral studies in
education, Oklahoma City Univ.

John F. Fischer,
forensic analyst, Orlando, FL

Eileen Gambrill,
prof. of social welfare,
Univ. of California at Berkeley

Luis Alfonso Gámez,
science journalist, Bilbao, Spain

Sylvio Garattini,
director, Mario Negri Pharmacology
Institute, Milan, Italy

Susan Gerbic,
founder and leader of the Guerilla Skepticism on Wikipedia (GSoW) project

Laurie Godfrey,
anthropologist, Univ. of Massachusetts

Gerald Goldin,
mathematician, Rutgers Univ., NJ

Donald Goldsmith,
astronomer; president, Interstellar Media

Alan Hale,
astronomer, Southwest Institute for Space
Research, Alamogordo, NM

Clyde F. Herreid,
prof. of biology, SUNY Buffalo

Gabor Hrasko,
chairman of the European Council of Skeptical Organizations (ECSO), president
of Hungarian Skeptics

Michael Hutchinson,
author; Skeptical Inquirer
representative, Europe

Philip A. Ianna,
assoc. prof. of astronomy,
Univ. of Virginia

I.W. Kelly,
prof. of psychology, Univ. of Saskatchewan,
Canada

Richard H. Lange,
MD, Mohawk Valley Physician
Health Plan, Schenectady, NY

William M. London,
California State Univ., Los Angeles

Rebecca Long,
nuclear engineer, president of Georgia
Council Against Health Fraud, Atlanta, GA

John R. Mashey,
computer scientist/executive (Bell
Labs, then Silicon Valley), analyst of
climate-change denial, contributor to
DeSmogBlog and Skeptical Science, Portola
Valley, CA

Thomas R. McDonough,
astrophysicist, Pasadena, CA

James E. McGaha,
astronomer, USAF pilot (ret.)

Joel A. Moskowitz,
director of medical psychiatry, Calabasas
Mental Health Services, Los Angeles

Matthew C. Nisbet,
professor of communication studies, public
policy, and urban affairs at Northeastern
University

Julia Offe,
neurobiologist, science journalist, creator
of German Science Slam

John W. Patterson,
prof. of materials science and
engineering, Iowa State Univ.

James R. Pomerantz,
prof. of psychology, Rice Univ.

Tim Printy,
amateur astronomer, UFO skeptic, former
Navy nuclear reactor operator/division
chief, Manchester, NH

Daisie Radner,
prof. of philosophy, SUNY Buffalo

Robert H. Romer,
prof. of physics, Amherst College

Karl Sabbagh,
journalist, Richmond, Surrey, England

Robert J. Samp,
assistant prof. of education and
medicine, Univ. of Wisconsin-Madison

Steven D. Schafersman,
asst. prof. of geology, Miami Univ., OH

Chris Scott,
statistician, London, England

Stuart D. Scott Jr.,
associate prof. of anthropology,
SUNY Buffalo

Erwin M. Segal,
prof. of psychology, SUNY Buffalo

Carla Selby,
anthropologist / archaeologist

Steven N. Shore,
prof. of astrophysics, Univ. of Pisa, Italy

Waclaw Szybalski,
professor, McArdle Laboratory, Univ.
of Wisconsin–Madison

Sarah G. Thomason,
prof. of linguistics, Univ. of Pittsburgh, PA

Tim Trachet,
journalist and science writer, honorary
chairman of SKEPP, Belgium

David Willey,
physics instructor, Univ. of Pittsburgh, PA

CENTERS FOR INQUIRY

www.centerforinquiry.org/about/branches

Transnational
3965 Rensch Road, Amherst, NY 14228
Tel.: (716) 636-4869

Austin
PO Box 300036, Austin, TX 78703
Tel.: (512) 454-0977

Chicago
chicago@centerforinquiry.org

Indianapolis
350 Canal Walk, Suite A, Indianapolis, IN 46202
Tel.: (317) 423-0710

Los Angeles
2535 W. Temple St., Los Angeles, CA 90026
Tel.: (323) 666-9797

Michigan
3777 44th Street SE, Grand Rapids, MI 49512
Tel.: (616) 698-2342

New York City
33-29 28th St. Astoria, NY 11106

San Francisco
email: sf@centerforinquiry.org

Tampa Bay
4011 S. Manhattan Ave. #139,Tampa, FL 33611-1277
Tel.: (813) 505-7013

Washington, DC
1020 19th Street NW, Suite 425
Washington, DC 20036
tel.: (202) 629-2403

Argentina
Buenos Aires, Argentina
alejandroborgo@gmail.com
Facebook: CFI Argentina

Canada
55 Eglinton Ave. East, Suite 307
Toronto, Ontario, M4P 1G8, Canada

China
China Research Institute for Science Popularization,
NO. 86, Xueyuan Nanlu Haidian Dist., Beijing,
100081 China
Tel.: +86-10-62170515

Egypt
44 Gol Gamal St., Agouza, Giza, Egypt

France
Dr. Henri Broch, Universite of Nice, Faculte des
Sciences, Parc Valrose, 06108, Nice cedex 2,
France Tel.: +33-492-07-63-12

Germany
Arheilger Weg 11, 64380 Rossdorf, Germany
Tel.: +49-6154-695023

India
46 Masi garh, New Friends Colony
New Delhi 110025
Tel.: 91-9868010950

London
Conway Hall, 25 Red Lion Square,
London WC1R 4RL, England

Nepal
Humanist Association of Nepal,
PO Box 5284, Kathmandu Nepal
Tel.: +977-1-4413-345

New Zealand
email: bcooke@centerforinquiry.net

Nigeria
PO Box 25269, Mapo, Ibadan, Oyo State, Nigeria
Tel.: +234-2-2313699

Peru
Ex. Dir. Manuel Paz-y-Miño
Calle El Corregidor 318, Rimac, Lima 25-PERU
email: humanarazon_peru@yahoo.com

Poland
Lokal Biurowy No. 8, 8 Sapiezynska Sr.,
00-215, Warsaw, Poland

Romania
Fundatia Centrul pentru Constiinta Critica
Tel.: (40)-(0)744-67-67-94
email: CenterforInquiry.Romania@gmail.com

Russia
Dr. Valerii A. Kuvakin, 119899 Russia, Moscow,
Vorobevy Gory, Moscow State Univ.,
Philosophy Department

Senegal
PO Box 15376, Dakar – Fann, Senegal
Tel.: +221-501-13-00

cfi
CENTER FOR INQUIRY

THE CONFERENCE DEDICATED TO SCIENCE AND REASON
CSICON 2019
OCTOBER 16-20, 2019 | THE FLAMINGO RESORT LAS VEGAS
It's the best bet in Las Vegas!
FEATURING:
BANACHEK
RICHARD DAWKINS
JOHN DE LANCIE
BRIAN GREENE
JEN GUNTER
BRITT MARIE HERMES
ELIZABETH LOFTUS
LEIGHANN LORD
MICHAEL MANN
JULIA SWEENEY
AND MANY MORE!
Flamingo
REGISTER AT CSICONFERENCE.ORG
cfi CENTER FOR INQUIRY